5.5 Jet Propulsion Laboratory (JPL)

This section describes the activities at the ECS portion of JPL during the operation of ECS Release B.

5.5.1 Key Interfaces: JPL DAAC-ECS

The JPL ECS DAAC interfaces with multiple entities external to the DAAC. Figure 5.5-1 schematically illustrates the interfaces between the ECS at the JPL DAAC and its external entities.

The following further describes the external entities, including those identified to support interface testing:

- JPL V0 DAAC - This interface provides access to data or other information that comes into the DAAC via the V0 IMS system but are archived into ECS, or into both ECS and the JPL V0 archive. The migration of V0 data sets into ECS will occur via this interface.

- SMC - This interface provides the capability for the JPL DAAC to receive configuration data, scheduling directives, policy and procedure information and user registration information. The JPL DAAC sends its summary fault and performance data, accounting data, resource utilization data, and status reports to SMC.

- Users - This interface is the mechanism for user community access to ECS data, products and services.

- ASTER GDS - This interface provides JPL ECS user or ASTER GDS user to view the data holding and order production data from the other system.

- SeaWinds SCF - This interface supports the SeaWinds science software integration and testing. SeaWinds algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to SeaWinds SCF. Section 5.5.1.1 also explains this interface.

- SSALT SCF - This interface supports the SSALT science software integration and testing. SSALT algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to SSALT SCF.

- DAO - This interface supports access to non-EOS data sets to satisfy ECS user query and to retrieve ancillary data for ECS standard product generation. Section 5.5.1.1 also explains this interface.

- ADEOS II - This interfaces are explained in detail in Section 5.5.1.1.

- National Ice Center - This interface will provide ice map data to JPL ECS DAAC.

- Radar ALT - This interface supports transfer of SSALT Level 0 data to JPL DAAC for higher level data production.
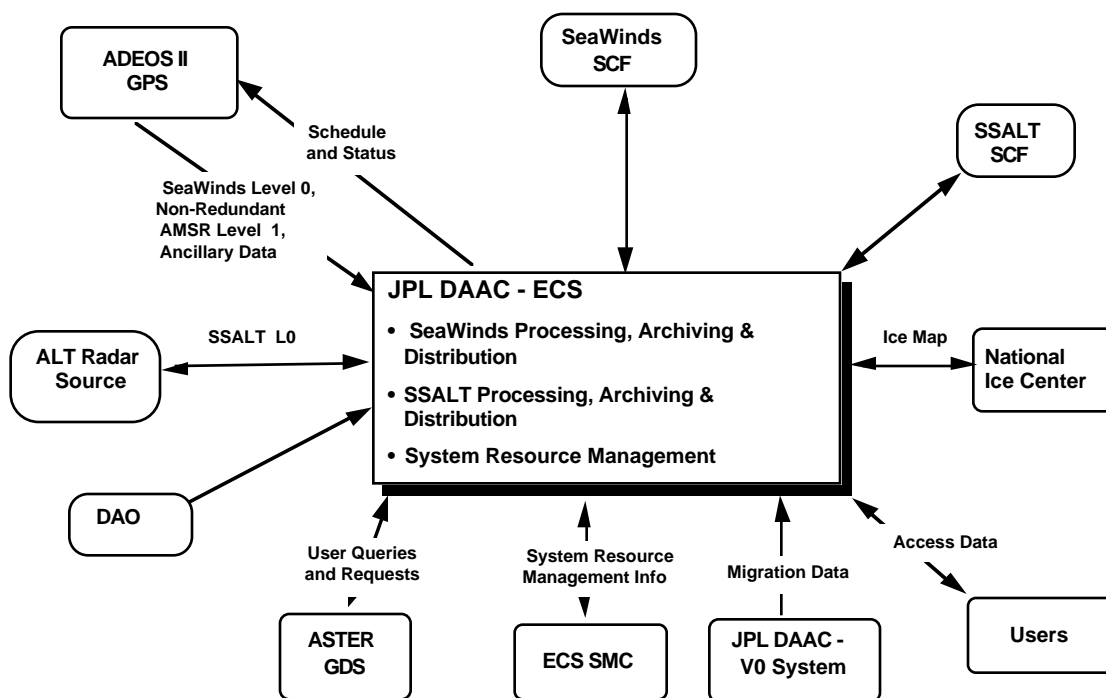

Figure 5.5.1-1. Release B Key Interfaces: JPL DAAC-ECS

5.5.1.1 SeaWinds Interfaces

(From: Implementation Plan for Support of the SeaWinds Project, Feb. 1995, JPL)

Interfaces with Japan are to:

- acquire the time ordered, non-redundant ADEOS-II Level 0 SeaWinds telemetry data in a timely manner,

- acquire the time ordered, non-redundant processed AMSR Level 1 data coincident with the Level 0 data,

- acquire ancillary data including ephemeris data, attitude data, and spacecraft clock data coincident with the Level 0 data,

- deliver processed higher level data to be used by Japanese Scientists,

   Interface with DAO NOAA is to:

- acquire the output from Numeric Weather Prediction Models

 Interfaces with SeaWinds SCF are to:

- integrate the algorithms with the ECS system,

- provide data and information relating to algorithm validation, model functional development, and data product validation,

Interfaces with National Ice Center are to:

- acquire ice map data to provide an input to the Level 2 data production.

5.5.2 JPL ECS Related Mission and Operations Activities

This section describes the mission and operation activities specific to the ECS portion of the JPL DAAC during Release B. The JPL Products from the Technical Baseline and the JPL User Pull Baseline during Release B are also included in this section.

5.5.2.1 JPL Release B

The following is a list of the Release B mission and operations activities for the JPL DAAC.

- Upgrade to support EOS AM-1 science operations

- Produce SeaWinds/SSALT higher level products

- Ingest SeaWinds/SSALT level 0 data

- Ingest AMSR data from Japan for use as SeaWinds ancillary data

- Support access to V0 data products

- Support access/distribution of products

5.5.2.2 JPL Products from Technical Baseline

Table 5.5-1 provides the products in the ECS Technical Baseline (Based on the AHWGP) which are either produced or archived at the DAAC in Release B.

Table 5.5-1. JPL Release B Product Baseline

Instrument	Platform	Production DAAC	Archival DAAC	Product Level
SSALT	RADAR ALT	JPL	JPL	1B
SSALT	RADAR ALT	JPL	JPL	2
SSALT	RADAR ALT	JPL	JPL	3
SSALT	RADAR ALT	JPL	JPL	4
SWS	ADEOS-II	JPL	JPL	1B
SWS	ADEOS-II	JPL	JPL	2

5.5.2.3 SeaWinds

A major mission to be supported by JPL during Release B is SeaWinds. This section provides a description of the mission responsibilities of the JPL DAAC for SeaWinds.

The JPL DAAC has been assigned the responsibility to support SeaWinds Project. During the operational phase of the mission, the JPL DAAC will:

- routinely retrieve ADEOS-II Level 0 data, AMSR Level 1 data, and other ancillary data from ADEOS II,

- routinely retrieve wind field data from DAO,

- routinely generate SeaWinds higher level data including baselined level 1B, level 2A, and level 2B data,

- provide on-line access of higher level data to authorized science team members during the validation period, and to the general scientific community during normal operations,

- provide off-line media access of higher level data to authorized science team members during the validation period, and to the general scientific community during normal operations,

- perform systems engineering during the maintenance and operations period for the ECS,

- perform integration and testing of deliveries made by either the ECS Project or SeaWinds Project,

- maintain the advertising service metadata,

- provide for reprocessing of the SeaWinds data products as required by the SeaWinds Project,

- conduct an Operational Readiness Review for release B of the ECS System.

5.5.2.4 JPL User Pull Baseline

Table 5.5.2.4-1 lists the Data Volumes and Usage Estimates for the JPL DAAC. See section 5.1.2 for a description of how the data was developed and definition of each of the parameters.

Table 5.5.2.4-1. JPL Data Volumes and Usage Estimates

	1-Apr-97		1-Apr-98		1-Apr-99		1-July-99		1-Jan-00	
	Low	High	Low	High	Low	High	Low	High	Low	High
Archive Vol (TB)	0.000	0.000	3.693	3.693	7.140	7.140	8.463	8.463	10.278	10.278
Distrib. Vol/yr (TB)	0.000	0.000	7.386	7.386	6.894	6.894	10.586	10.586	7.262	7.262
GB/day produced/migrated	0.00	0.00	10.12	10.12	13.49	13.49	7.67	7.67	7.67	7.67
#Users/yr	0	0	2000	3000	3000	5000	3500	6000	5000	6500
#DAAC Accesses/yr	0	0	20000	60000	30000	100000	35000	120000	50000	130000

5.5.3 Day in the Life of ECS at the JPL DAAC

Activities described in this section occurred on Wednesday, 01-Sep-99, during Epoch "k." This section provides a retrospective look at the operational activities of the day. That is, it is the "as executed" data for that day. Activities (and their key metrics) performed with ECS resources at the DAAC are shown in Table 5.5.3-1. Note that these are daily averages for Epoch k. Data for this day may vary from the average. Figure 5.5.3-1 shows a composite summary of those activities.

Figures 5.5.3-2 through 5.5.3-8 show Release B and Release C activities leading up to and during this period. Activities related to Releases C & D missions have not been defined. Some non-operational activities may have an impact on operations by reassigning resources from operations to test. However, this "Day in the Life" material assumes there were no impacts from these activities to ingest, production, archive and data distribution operations.

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Table 5.5.3-1. Activities in the Day in the Life of ECS at JPL (1 of 2)

Activity	Description	Metrics (daily average)	
ECS production planning	Processing	Number of processes	
	• ADEOS-2/SWS	62	
	• RADAR ALT/DFA+MR processing	114	
	Reprocessing		
	• None		
ES ingest	Processing	Ingests per day	
	• ADEOS-2/SWS	1	
	• RADAR ALT/DFA+MR	1	
	Reprocessing		
	• None		
	Other		
	• Migrated V0 data	48 from V0 migration system	
	• Ad Hoc data*	96 from miscellaneous sources	
ECS product generation	Processing	Hours of product generation	
	• ADEOS-2/SWS	5 days per week, 8 hours/day	
	• RADAR ALT/DFA+MR processing	5 days per week, 8 hours/day	
	Reprocessing		
	• None		
ECS archive	Processing	# of Files	Vol. (MB)
	• ADEOS-2/SWS data	67	4,720
	• RADAR ALT/DFA+MR data	89	344
	Reprocessing		
	• None		
	Other		
	• Migrated V0 data	100	10,023
	• Ad hoc data*	300	300
ECS electronic data distribution through ECS client or web	• User pull	7 days/week, 24 hours/day	
	• Number of user accesses per day	329	
ECS hard media data distribution	• Distribution of hard media	Vol. (MB)	# of Orders
		5,064	6
ECS user services	• Staffed hours	5 days/week, 8 hours/day	
ECS operations	Science data production		
	• Staffed hours	5 days/week, 8 hours/day	
	• Un-staffed hours	No science data production	
	Other operations		
	• Staffed hours	5 days/week, 8 hours/day	
	• Un-staffed hours	Remote monitoring from SMC	
ECS engineering	• Staffed hours	5 days/week, 8 hours/day	

*   "Ad Hoc" data are used as a place holder for any miscellaneous files that are archived. Examples include files ingested from hard media or electronically from users/SCFs.
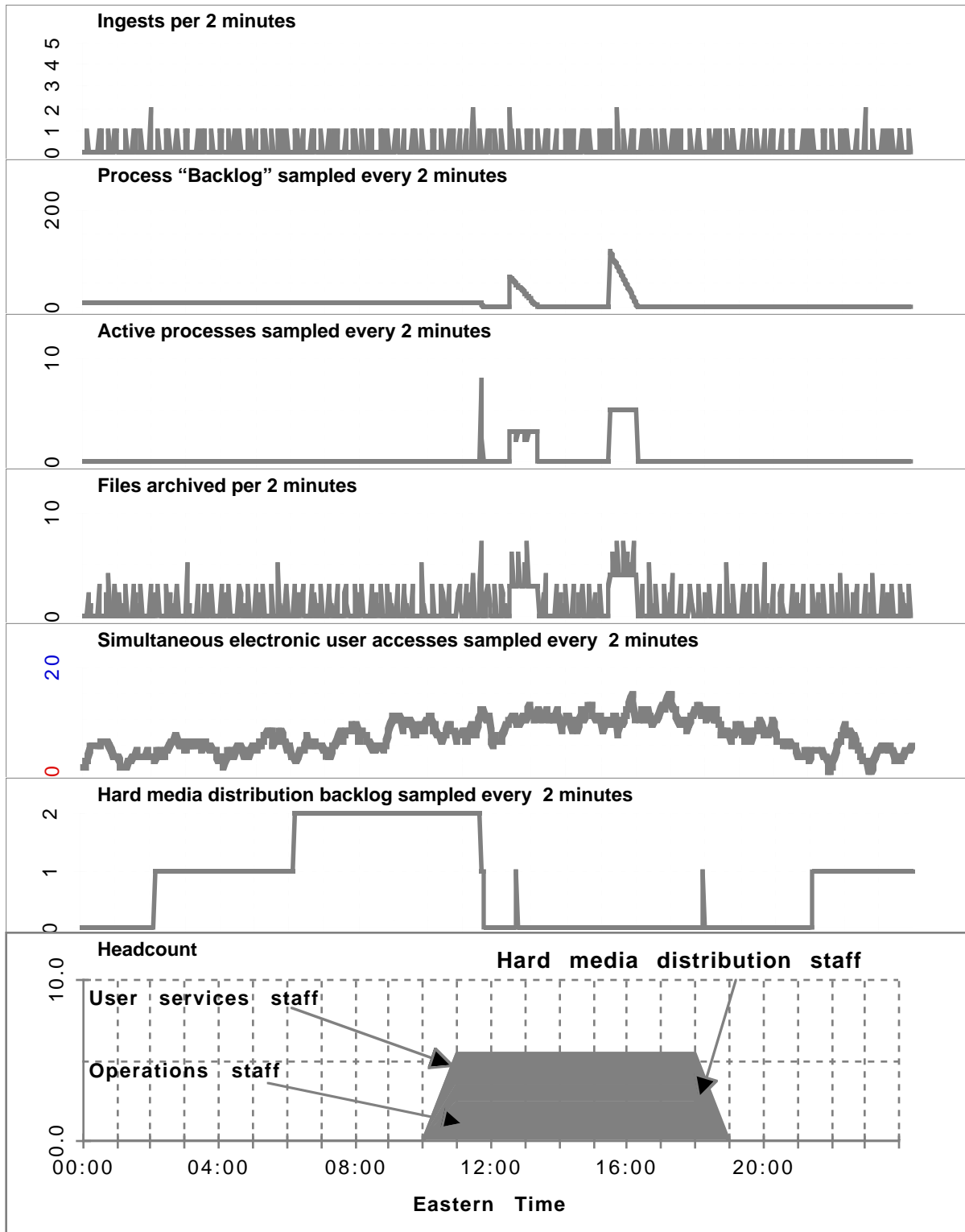
Figure 5.5.3-1. Overview of Day in the Life of ECS at JPL

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Name	1994	1995	1996	1997	1998	1999	2000
B: ECS development milestones			11/1 ▬▬▬			9/30	
B: HW installations			11/1 ▮ 6/11				
B: Consent to ship Review			6/1 ◆				
B: Site acceptance testing			6/1 ▮ 9/4				
B: Release Readiness Review			9/1 ◆				
B: Site HW capacity upgrades				5/1 ▮ 7/30			
B: Site capacity upgrades testing				8/1 ▮ 9/30			

Figure 5.5.3-2. JPL Related Release B Development Milestones

Name	1994	1995	1996	1997	1998	1999	2000
B: Science SW			10/8 ▬▬ 2/17				
B: ADEOS-2 mission integration support			11/3 ▮ 12/19				
B: RADAR ALT mission integration support			11/3 ▮ 12/19				

Figure 5.5.3-3. JPL Science SW Activities

Name	1994	1995	1996	1997	1998	1999	2000
B: System integration			9/3 ▬▬ 2/13				
B: V0 interoperability			10/6 ▮ 12/5				
B: IV&V			9/3 ▬▬ 11/20				
B: IV&V: JPL testing			10/23 ▮ 11/6				
B: I/F integration and test			11/21 ▬▬ 2/13				
B: System integration			11/21 ▬▬ 2/13				
B: DAAC - DAAC integration			11/21 ▮ 12/17				
B: ETS - ECS integration			12/18 ▮ 1/1				
B: EDOS-EBNET-ECS integration			1/2 ▮ 2/5				
B: ECS-ancillary data integration			2/6 ▮ 2/13				

Figure 5.5.3-4. JPL System Integration Activities

Name	1994	1995	1996	1997	1998	1999	2000
B: Training and certification			6/1			1/15	
B: Operator training (classroom, IATO, IV&V, OJT, etc.)			6/1			1/15	
B: Operator certification				1/15			
B: Mission certification			2/17	3/2			
B: AM-1 Landsat-7 EOSDIS Version 2 Baseline Test			2/17	3/2			
B: ECS Version 2 Baseline Certification			2/17	3/2			

Figure 5.5.3-5. JPL Mission Readiness, and Training and Certification Activities

Name	1994	1995	1996	1997	1998	1999	2000
B: Mission operations			6/1				3/
B: V0 data migration & distribution			6/1			10/29	
B: ADEOS-2 operations					2/28		3/
B: ADEOS-2 - SWS product generation					2/28		3/3
B: RADAR ALT operations				3/31			3/
B: RADAR ALT - DFA product generation				3/31			3/3
B: RADAR ALT - MR product generation				3/31			3/3

Figure 5.5.3-6. JPL Mission Operations Activities

Name	1994	1995	1996	1997	1998	1999	2000
B: ECS maintenance and sustaining engineering			9/1				3/
B: Operations readiness and performance assurance			9/1				3/3
B: Sustaining engineering			9/1				3/3
B: Property management, HW maintenance and ILS			9/1				3/3
B: Resource planning and performance analysis			9/1				3/3

Figure 5.5.3-7. JPL Maintenance and Sustaining Engineering Activities

Name	1994	1995	1996	1997	1998	1999	2000
C: ECS development milestones					2/1	▬▬▬	4/
C: HW installations					2/1 ▣	7/30	
C: Consent to Ship Review					11/1 ◆		
C: ECS independent acceptance testing					11/1 ▌	12/1	
C: Release Readiness Review					11/1 ◆		
C: Operations transition (estimated)					4/1	◆	

Figure 5.5.3-8. JPL Related Release C Development Milestones

5.5.3.1 JPL Production Operations

This section provides an end of day view of processing of ADEOS-2/SWS and RADAR ALT/DFA+MR products. Because Epoch k is less than a year after launch no reprocessing is shown. Two sets of data are shown for the processing production:

- Process Backlog. A process goes into a "backlog" state when data is ingested and its processing can be scheduled as a result of that ingest. For example, the ADEOS-2/SWS data is ingested once a day. This model assumes that all processes go into a "backlog" state then. A process may be one or more PGEs.

- Active Processes. The model assumes that two strings are available for use. The average time required for a process to complete is determined by dividing the number of processes executed in a day by the number of hours of production. The model assumes that each string can execute one or more processes in the two minute time step. The model also assumes that excess capacity is available and each process completes faster than the average as described below:

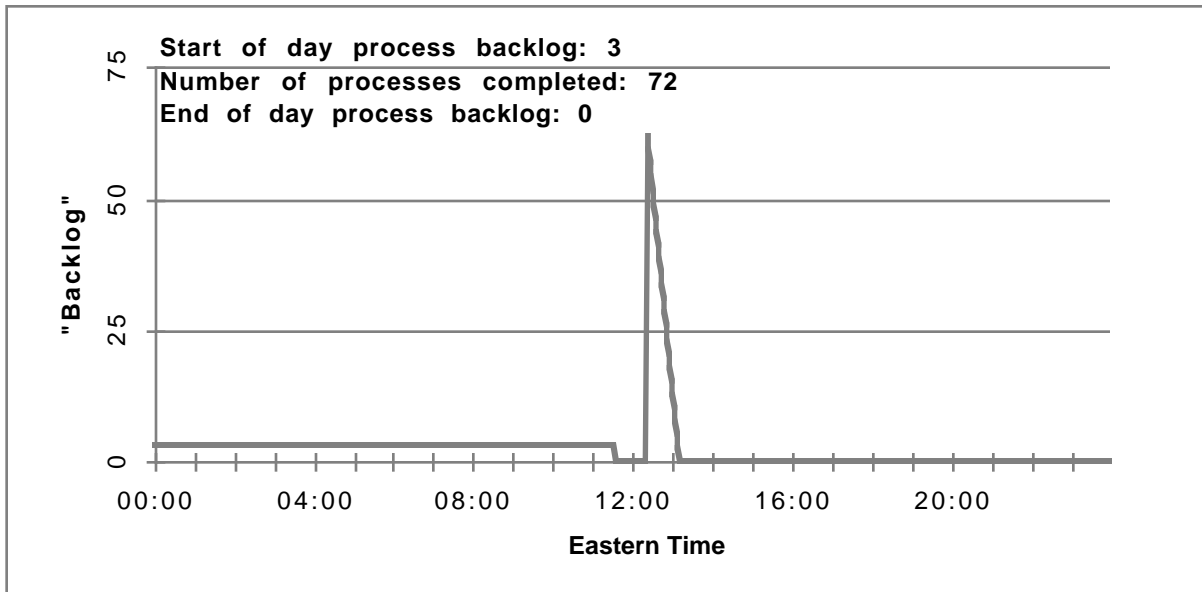 - Ten times faster for ADEOS-2/SWS and RADAR ALT/DFA+MR.

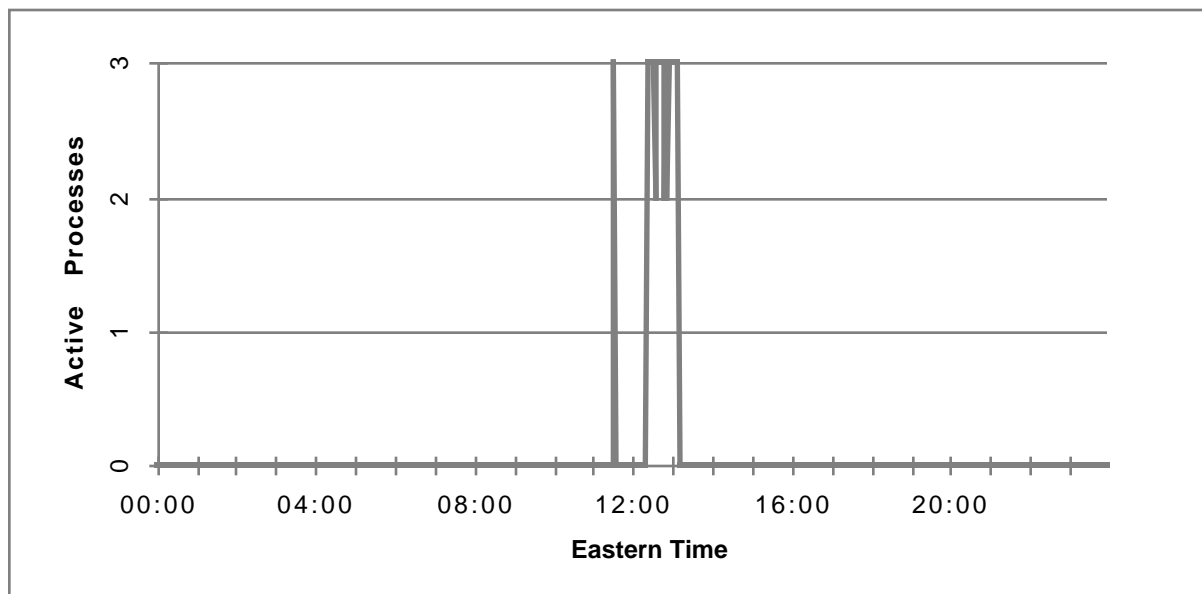*Figure 5.5.3.1-1. JPL ADEOS-2/SWS Processing Process Backlog*

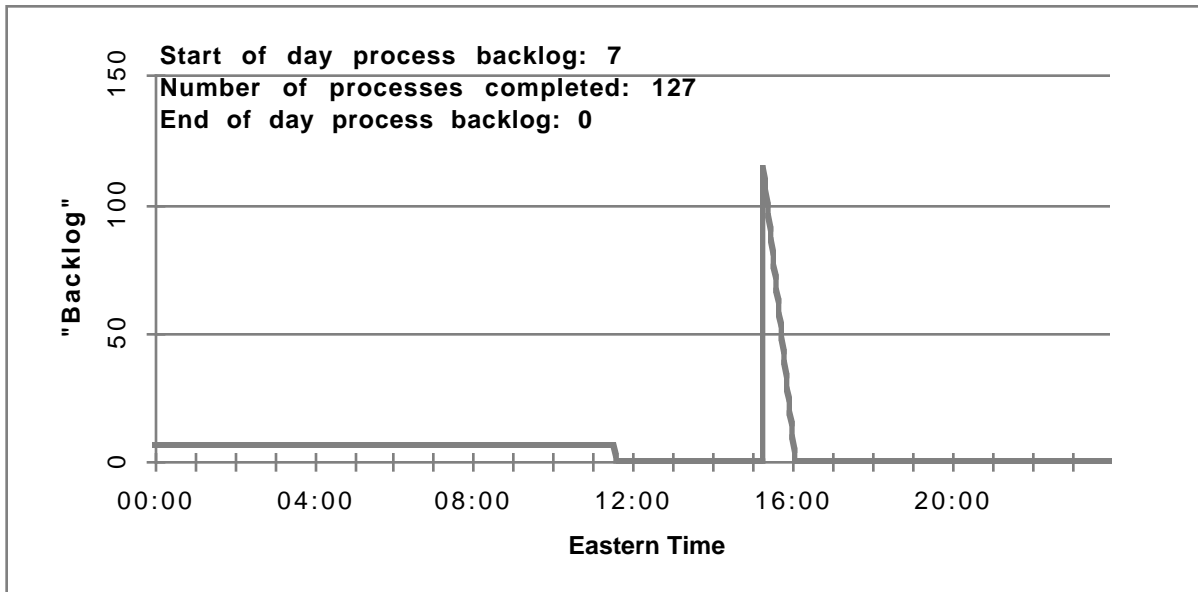*Figure 5.5.3.1-2. JPL ADEOS-2/SWS Processing Active Processes*

Start of day process backlog: 7
Number of processes completed: 127
End of day process backlog: 0

Figure 5.5.3.1-3. JPL RADAR ALT/DFA+MR Processing Process Backlog
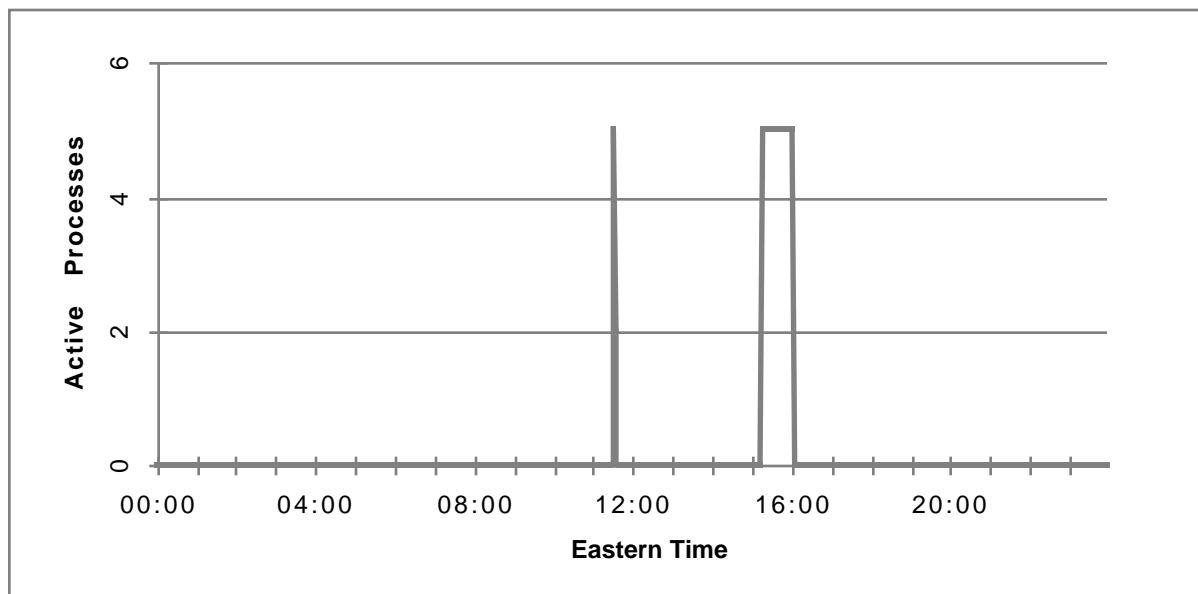
Figure 5.5.3.1-4. JPL RADAR ALT/DFA+MR Processing Active Processes

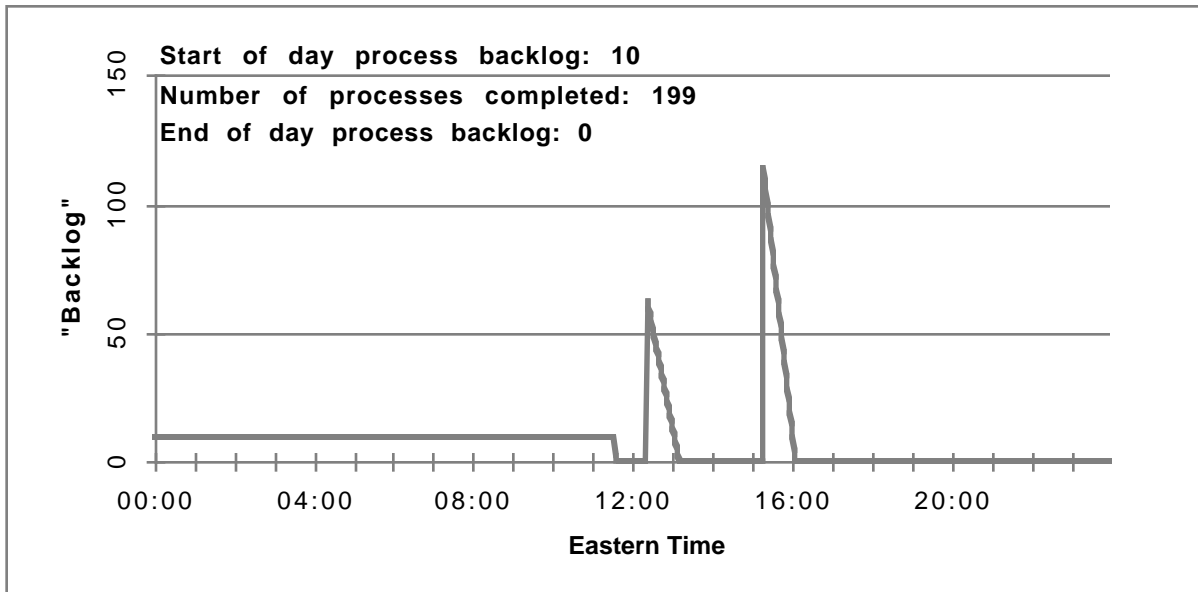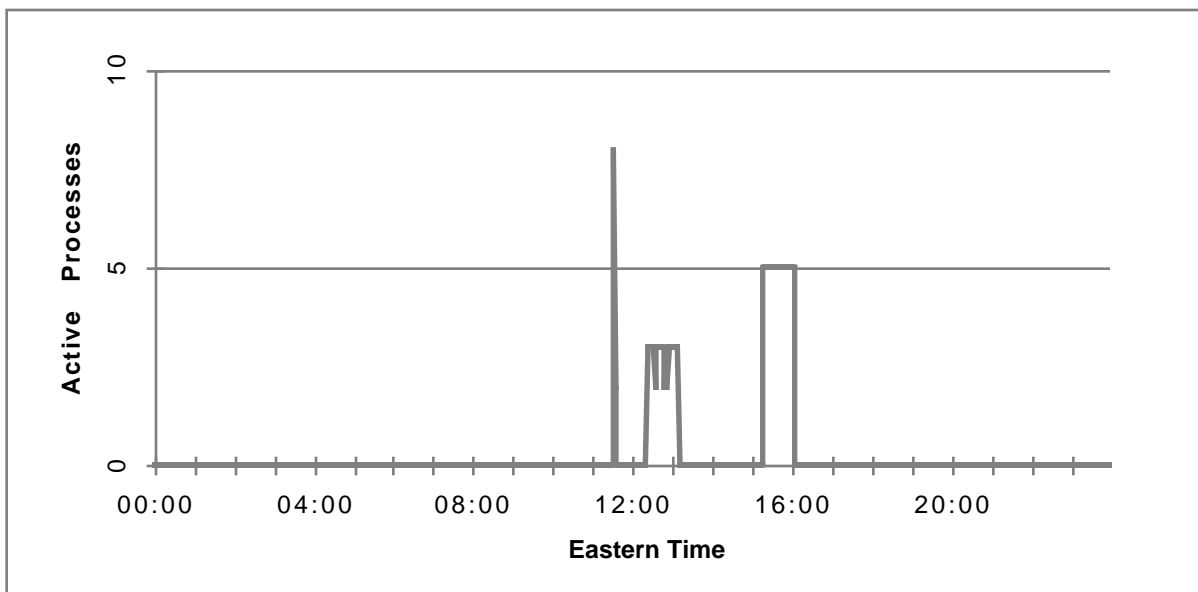**Start of day process backlog: 10**
Number of processes completed: 199
End of day process backlog: 0

Figure 5.5.3.1-5. JPL Composite Process Backlog

Figure 5.5.3.1-6. JPL Composite Active Processes

5.5.3.2 JPL Archive Operations

The Production Monitor/QA monitors the insertion of files into the archive. The figures in this section show the archive writes for activities shown in Table 5.5.3-1.
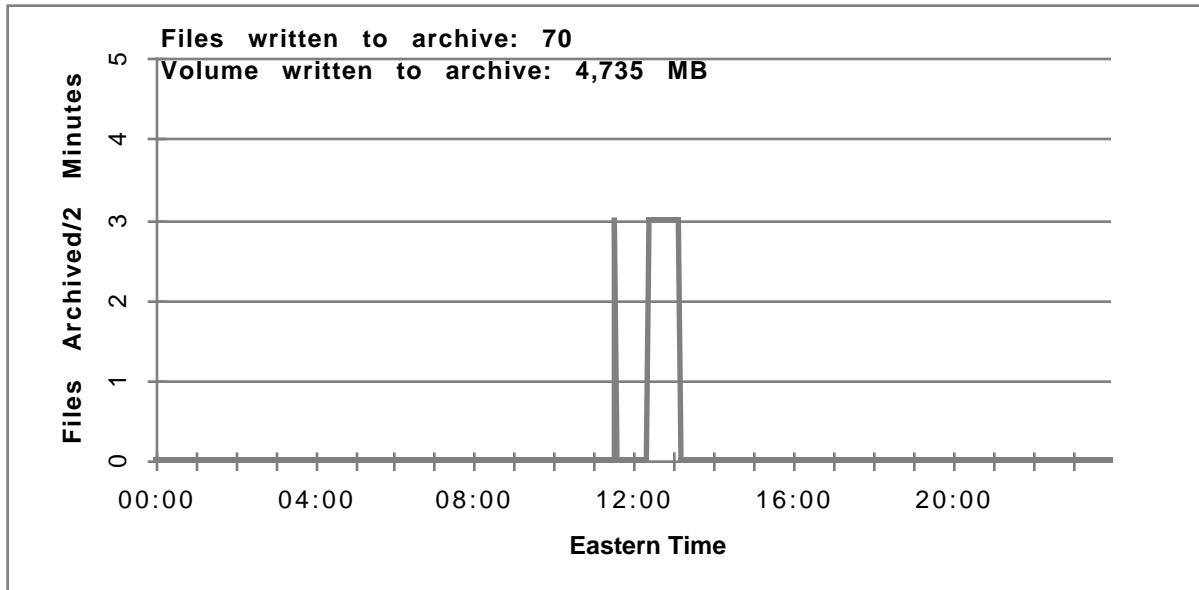

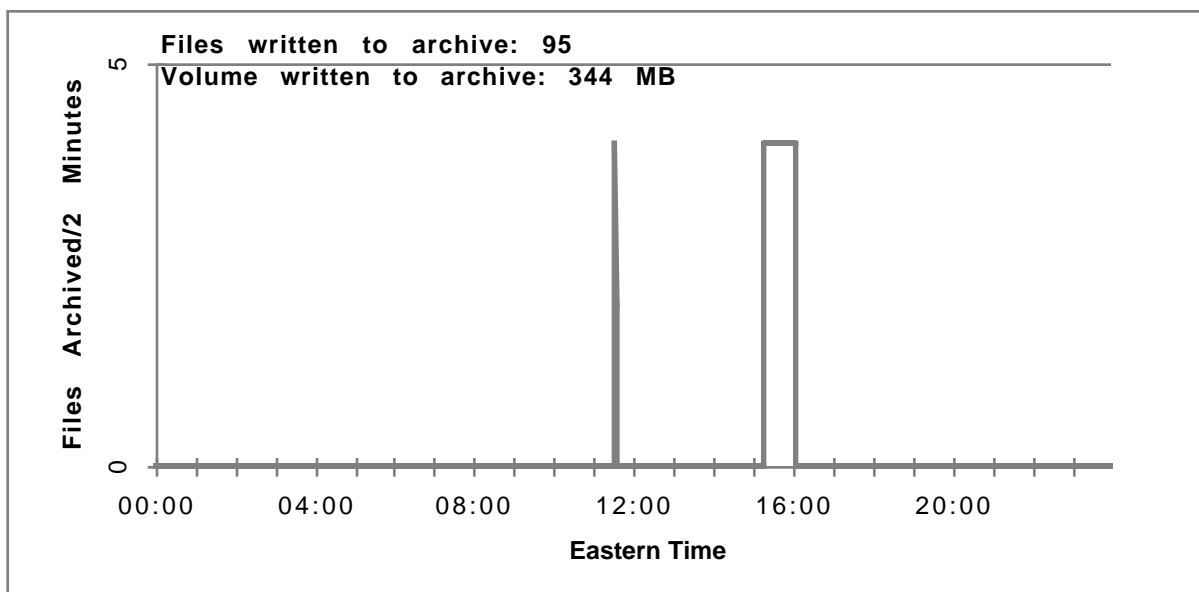**Figure 5.5.3.2-1. JPL ADEOS-2/SWS Routine Product Archive Write Operations**

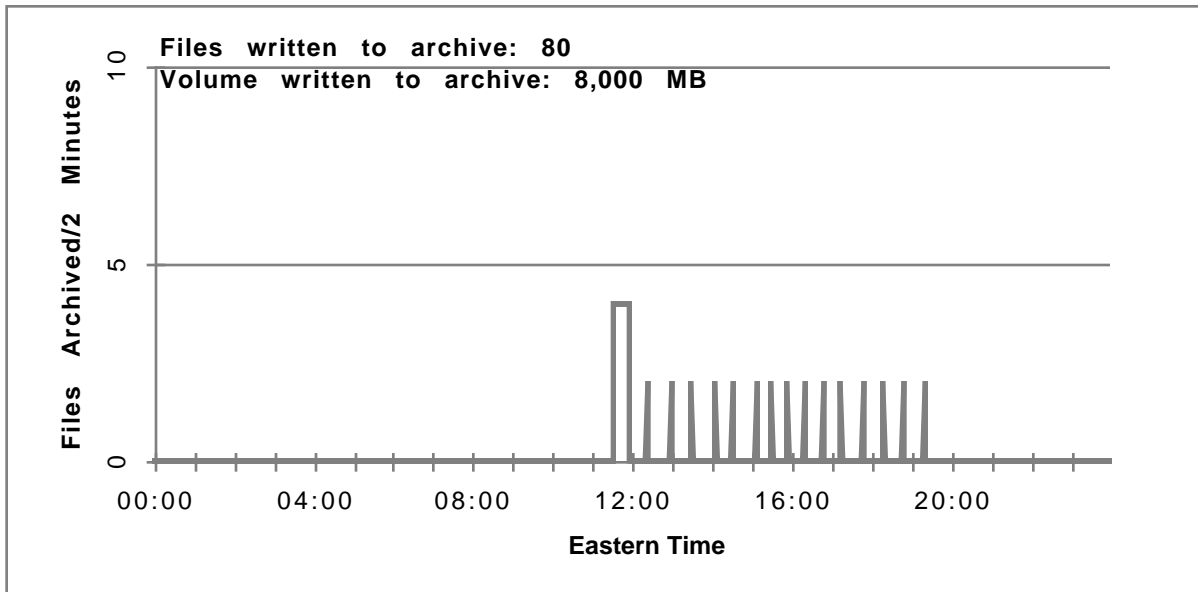**Figure 5.5.3.2-2. JPL RADAR ALT/DFA+MR Routine Product Archive Write Operations**

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Files written to archive: 80
Volume written to archive: 8,000 MB

Figure 5.5.3.2-3. JPL V0 Migration Archive Write Operations

Files written to archive: 288
Volume written to archive: 288 MB
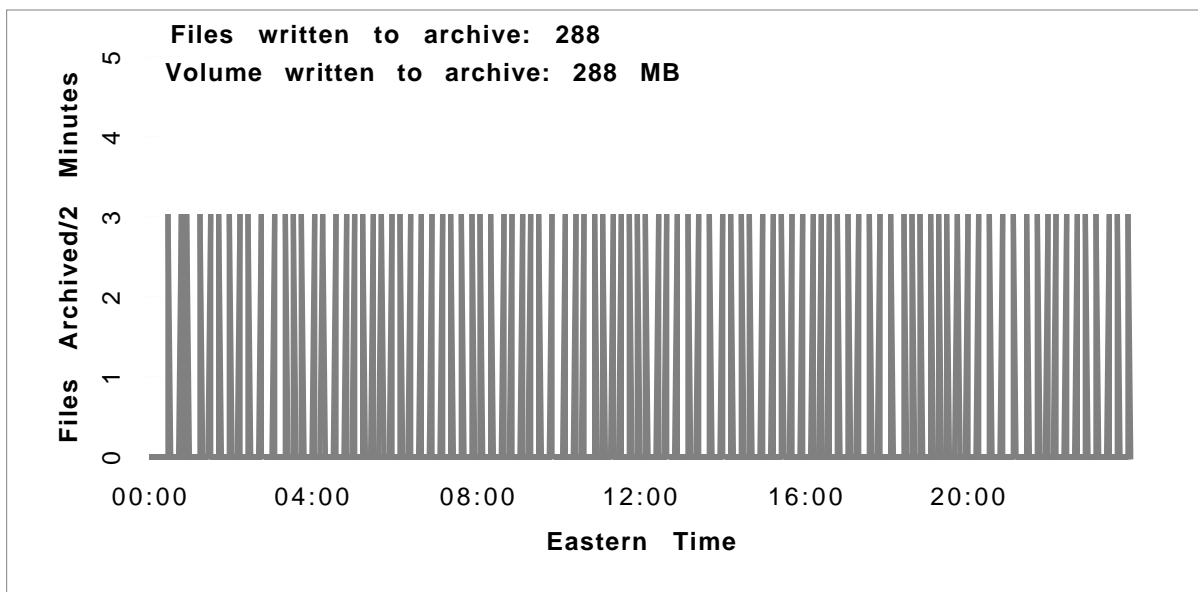
Figure 5.5.3.2-4. JPL Ad Hoc Archive Write Operations

Files written to archive: 533
Volume written to archive: 13,367 MB
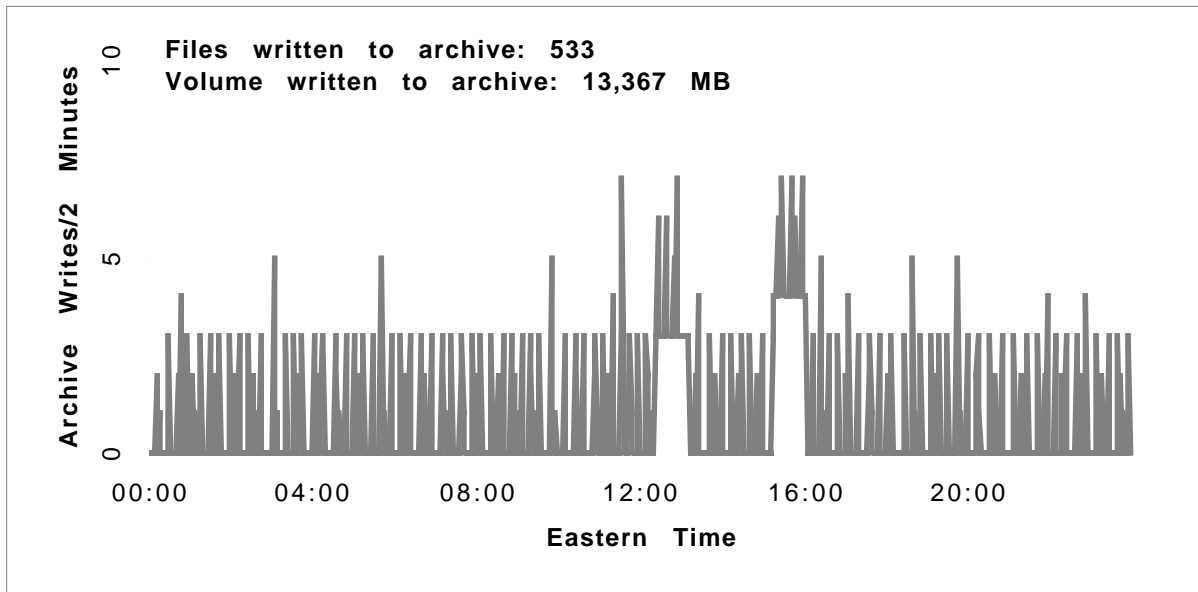
Figure 5.5.3.2-5. JPL Composite Archive Write Operations

5.5.3.3 JPL Product Distribution Operations

5.5.3.3.1   JPL Hard Media Distribution Operations

Table 5.5.3.3-1 summarizes the key parameters that influence distribution of hard media. The following steps in the creation of a media shipment are assumed:

1. Load media and initialize. The operator prints and applies the media labels, loads the media (either CD or Tape), and initiates writing of the media. It is assumed that any given order is limited to no more than 10 pieces of media. Larger orders are assumed to be segmented into multiple smaller orders.

2. Media creation. Data are written to the media.

3. Unload/reload. After the media are created, the media are unloaded and reloaded into a different device for a quality assurance read check.

4. Media QA. All data written to the media are read and compared to the original data.

5. Package. Media are unloaded, packaged, addressed, etc.

Figure 5.5.3.3-1 shows the day's hard media distribution backlog in terms of orders and media (and how it changed throughout the work day) for all data sets distributed by ECS. Figure 5.5.3.3-2 shows distribution of orders and number of media mapped against order size. Table 5.5.3.3-2 summarizes the day's media creation and distribution activities.

Table 5.5.3.3-1. JPL Hard Media Distribution Parameters

Topic	Assumption
Hours of hard media distribution	5 days per week, 8 hours per day
Number of media distribution operators	1 per shift
Touch time assumptions: 1. Load media and initialize	5 min. for 1st piece in an order, 1 min. for each additional piece of media
2. Media creation	Tape: • 500 KB/sec CD-ROM • 250 KB/sec
3. Unload/reload	5 min. for 1st piece in an order, 1 min. for each additional piece of media
4. Media QA	See step 2
5. Packaging	10 min. for 1st piece in an order, 2 min. for each additional piece of media
Minimum order size	100 MB
Media volume capacity 1. CD-ROM 2. Tape	 2,000 MB 10,000 MB

*   May also perform other functions including production planning, production monitor, resource manager, hard media ingest, and/or mail distribution
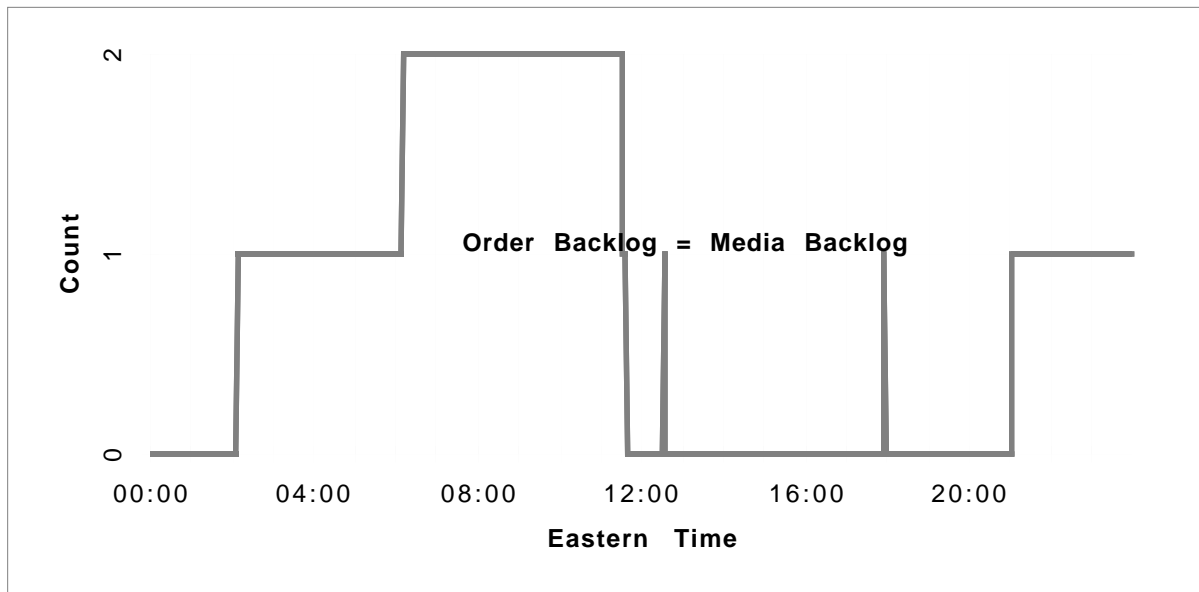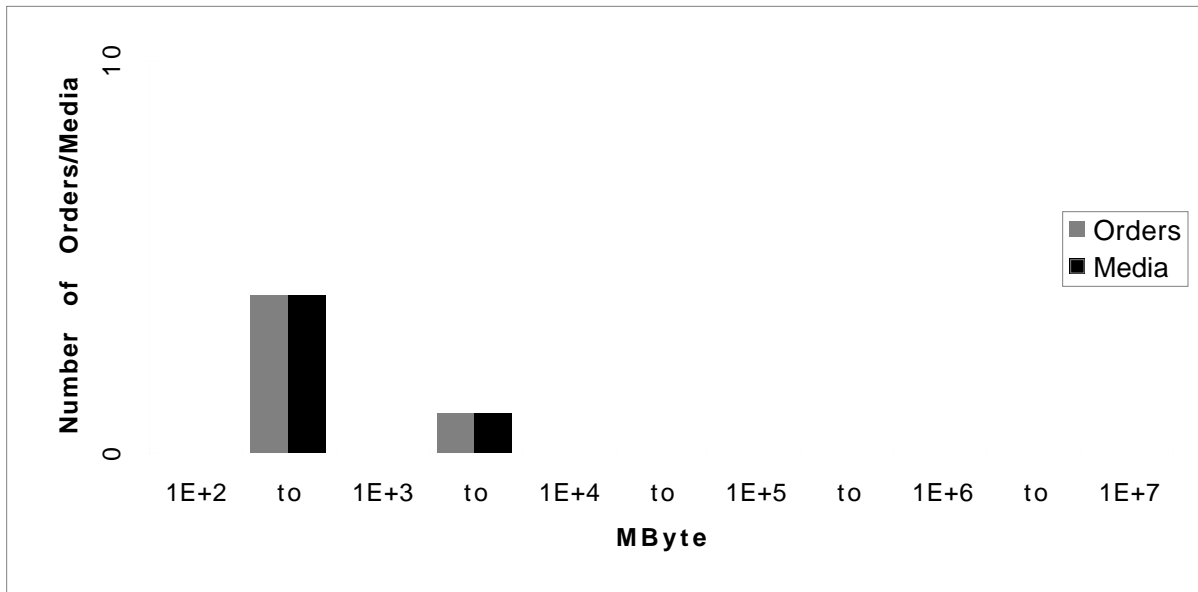

Figure 5.5.3.3-1. JPL Hard Media Distribution Backlog

Figure 5.5.3.3-2. JPL Orders and Media by Order Volume

Table 5.5.3.3-2. JPL Media Distribution Summary

Topic	Number of orders	Volume (MB)	Number of media
Start of day in work	0	0	0
Start of day backlog	0	0	0
Orders received	5	4,472	5
Data distributed	4	4,191	4
End of day in work	0	0	0
End of day backlog	1	281	1

5.5.3.3.2   JPL Electronic Distribution Operations

Electronic distribution is performed 24 hours/day, 7 days/week. Figure 5.5.3.3-3 shows the day's distribution of user sessions that connect to ECS through the JPL DAAC.
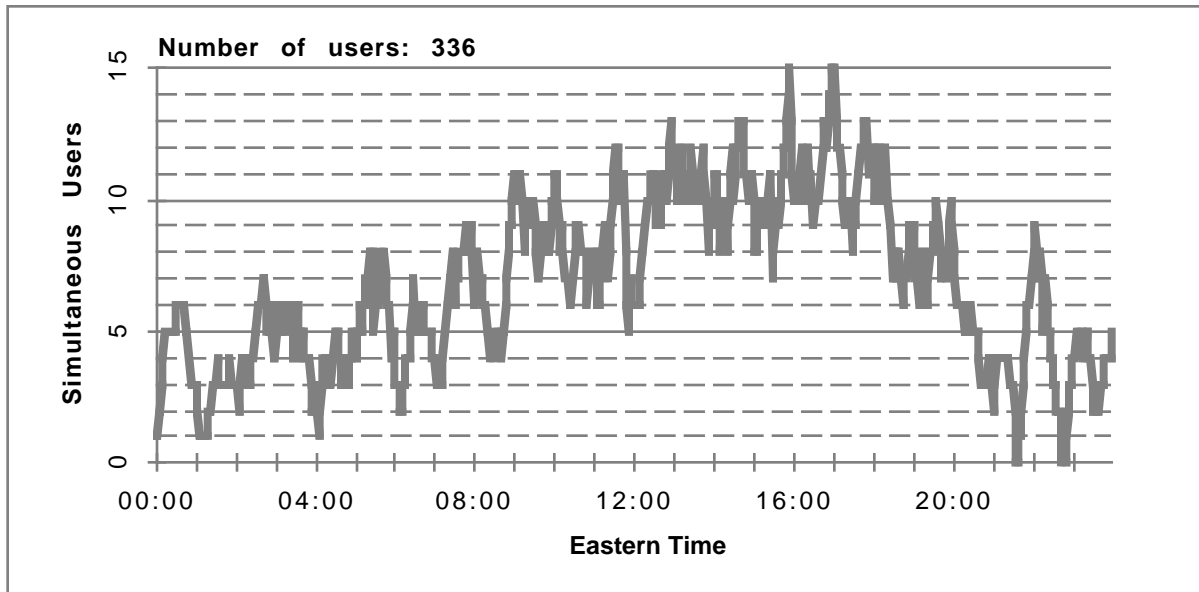
Figure 5.5.3.3-3. JPL User Sessions

5.6 Langley Research Center (LaRC)

This section describes the activities at the ECS portion of LaRC during the operation of ECS Release B.

5.6.1 Key Interfaces: LaRC DAAC-ECS

The LaRC ECS DAAC interfaces with multiple entities external to the DAAC. Figure 5.6.1-1 schematically illustrates the interfaces between the ECS at the LaRC DAAC and its external entities.

The following further describes the external entities, including those identified to support interface testing:

- LaRC V0 DAAC - This interface provides access to data or other information that comes into the DAAC via the V0 IMS system but are archived into ECS, or into both ECS and the LaRC V0 archive. The migration of V0 data sets into ECS will occur via this interface.

- SMC - This interface provides the capability for the LaRC DAAC to receive configuration data, scheduling directives, policy and procedure information and user registration information. The LaRC DAAC sends its summary fault and performance data, accounting data, resource utilization data, and status reports to SMC.

- Users - This interface is the mechanism for user community access to ECS data, products and services.

- ASTER GDS - This interface provides LaRC ECS user or ASTER GDS user to view the data holding and order production data from the other system.

- EDOS - The science data stream down linked from the EOS AM-1 CERES, MOPITT, MISR instruments are routed from EDOS to LaRC ECS DAAC after processing to Level 0.

- METEOR Source - This interface supports transfer of SAGE III Level 0 data to LaRC DAAC for higher level data production.

- ACRIM Source - This interface supports transfer of ACRIM Level 0 data to LaRC DAAC for higher level data production.

- SDPF - The science data stream down linked from the EOS TRMM CERES instrument is routed from TRMM SDPF to LaRC ECS DAAC after Level 0 processing. This interface also supports transfer of orbit data for CERES data production.

- Ancillary Source - (NOAA or other ADC) This interface supports access to non-EOS data sets to satisfy ECS user query and to retrieve ancillary data for ECS standard product generation.

- GSFC DAAC - This interface allows GSFC DAAC to transfer NMC, VIRS Cloud Imager and TOMS Ozone data to LaRC DAAC.

- MSFC DAAC - This interface allows MSFC DAAC to transfer TMI Microwave Water Path data to LaRC DAAC.
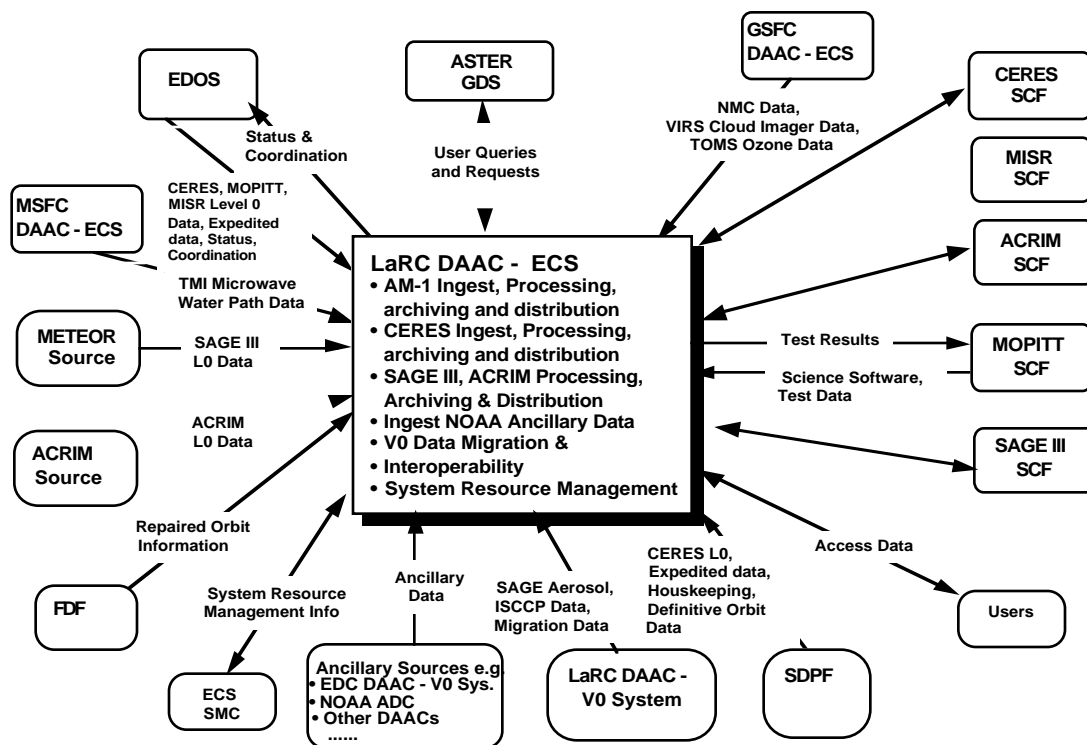
Figure 5.6.1-1. Release B Key Interfaces: LaRC DAAC-ECS

- ACRIM SCF - This interface supports the ACRIM science software integration and testing. ACRIM algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to ACRIM SCF.

- SAGE III SCF - This interface supports the SAGE III science software integration and testing. SAGE III algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to SAGE III SCF.

- CERES SCF - This interface supports the CERES science software integration and testing. CERES algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to CERES SCF.

- MISR SCF - This interface supports the MISR Instrument Team. MISR algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to MISR SCF.

- MOPITT SCF - This interface supports the MOPITT Instrument Team. MOPITT algorithms, metadata, science software, test data are example of things that will cross this interface and test results are sent back to MOPITT SCF.

- FDF - This interface is required to provide AM-1 satellite refined orbit/attitude data. This data is required for the processing of the EOS AM-1 CERES, MOPITT and MISR data.

5.6.2 LaRC ECS Related Mission and Operations Activities

This section describes the mission and operation activities specific to the ECS portion of the LaRC DAAC during Release B and the retained activities from Release A. The LaRC Products from the Technical Baseline and the LaRC User Pull Baseline during Release B are also included in this section.

5.6.2.1 LaRC Release B

The following is a list of the Release B mission and operations activities for the LaRC DAAC.

- Full functionality to support EOS AM-1 science operations: Ingest CERES/MOPPIT/MISR level 0 from EDOS, produce CERES/MOPPIT/MISR higher level products

- Support algorithm I&T for AM-1 CERES, MOPPIT and MISR instruments

- Support operations for TRMM: Ingest CERES level 0 from SDPF, produce CERES higher level products, archive and access/distribute of TRMM CERES data products

- Produce ACRIM/SAGE III higher level products

- Support algorithm I&T for SAGE III and ACRIM

- Support access to V0 data products

- Support access/distribution of products

5.6.2.2 LaRC Release A

The following are the Release A mission and operations activities for the LaRC DAAC. Some of this activities will be retained in Release B.

- Support operations for TRMM: Ingest CERES level 0 from SDPF, produce CERES higher level products, archive and access/distribute of TRMM CERES data products

- MISR and MOPITT algorithm integration and test

- CERES algorithm updates integration and test

- AM-1 interface test support

- V0 data migration, archive and distribution

- Transition to Release B baseline

- Above activities parallel to V0 operations

5.6.2.3 LaRC Products from Technical Baseline

Table 5.6.2.3-1 provides the products in the ECS Technical Baseline (Based on the AHWGP) which are either produced or archived at the DAAC in Release B.

Table 5.6.2.3-1. LaRC Release B Product Baseline

Instrument	Platform	Production DAAC	Archival DAAC	Product Level
ACRIM	ACRIMSAT	LaRC	LaRC	1A
CERES	TRMM,AM	LaRC	LaRC	1B
CERES	TRMM,AM	LaRC	LaRC	2
CERES	TRMM,AM	LaRC	LaRC	3
MISR	AM	LaRC	LaRC	1A
MISR	AM	LaRC	LaRC	1B
MISR	AM	LaRC	LaRC	2
MISR	AM	LaRC	LaRC	3
MISR	AM	LaRC	LaRC	3
MOPITT	AM	LaRC	LaRC	1B
MOPITT	AM	LaRC	LaRC	2
MOPITT	AM	LaRC	LaRC	3
SAGE-III	METEOR	LaRC	LaRC	1B
SAGE-III	METEOR	LaRC	LaRC	2

5.6.2.4 LaRC Activities for AM-1 Mission

ECS provides ground support for EOS AM-1 spacecraft and instrument mission operations. This support includes mission planning, scheduling, control, monitoring, and analysis for the AM-1 spacecraft and its instruments. The AM-1 payload complement consists of five instruments: ASTER, CERES, MISR, MODIS, and MOPITT. ASTER and MODIS are Facility Instruments on AM-1 and are coordinated by Team Leads (TL) for their operations. CERES, MISR and MOPITT operations are coordinated by their principal investigators (PIs). The CERES PI facility is located at LaRC in Hampton, Virginia. The MISR PI facility is located at JPL. The MOPITT PI facility is located at the University of Toronto, Ontario, Canada.

EDOS is the EOSDIS component that supports real time and Level 0 data delivery operations for the EOS spacecraft. EDOS performs Level 0 data production, quick look processing, Level 0 Production Data Set distribution, Quick Look Data Set distribution, and backup data archive service.

LaRC ECS DAAC is responsible for acquiring Level 0 data from EDOS for CERES, MISR and MOPITT instruments. Once higher level data products are produced in LaRC DAAC, LaRC DAAC will archive, provide access to and distribute these higher level data products.

5.6.2.5 LaRC User Pull Baseline

Table 5.6.2.5-1 lists the Data Volumes and Usage Estimates for the LaRC DAAC. See section 5.1.2 for a description of how the data was developed and definition of each of the parameters.

Table 5.6.2.5-1. LaRC Data Volumes and Usage Estimates

	1-Apr-97		1-Apr-98		1-Apr-99		1-July-99		1-Jan-00	
	Low	High	Low	High	Low	High	Low	High	Low	High
Archive Vol (TB)	0.903	0.903	3.396	3.396	33.361	33.361	47.877	47.877	84.356	84.356
Distrib. Vol/yr (TB)	1.806	1.806	4.987	4.987	59.929	59.929	116.132	116.132	145.916	145.916
GB/day produced/migrated	9.90	9.90	13.10	13.10	125.97	125.97	158.21	158.21	201.35	201.35
#Users/yr	200	300	700	1000	1500	2500	1500	3000	1500	3500
#DAAC Accesses/yr	2000	6000	7000	20000	15000	50000	15000	60000	15000	70000

5.6.3 Day in the Life of ECS at the LaRC DAAC

Activities described in this section occurred on Wednesday, 01-Sep-99, during Epoch "k." This section provides a retrospective look to the operational activities of the day. That is, it is the "as executed" data for that day. Activities (and their key metrics) performed with ECS resources at the DAAC are shown in Table 5.6.3-1. Note that these are daily averages for Epoch k. Data for this day may vary from the average. Figure 5.6.3-1 shows a composite summary of those activities.

Figures 5.6.3-2 through 5.6.3-8 show Release B and Release C activities leading up to and during this period. Activities related to Releases C & D missions have not been defined. Some non-operational activities may have an impact on operations by reassigning resources from operations to test. However, this "Day in the Life" material assumes there were no impacts from these activities to ingest, production, archive and data distribution operations.

Table 5.6.3-1. Activities in the Day in the Life of ECS at LaRC (1 of 2)

Activity	Description	Metrics (daily average)
ECS production planning	Processing • TRMM/CERES • AM1/CERES • AM1/MISR • AM1/MOPITT • AM1/Subsetting* • METEOR/SAGE III**** • FOO/ACRIM Reprocessing • TRMM/CERES • AM1/CERES • AM1/MISR • AM1/Subsetting* • AM1/MOPITT • METEOR/SAGE III****	Number of processes 103 103 225 4 338 80 15 103 103 225 338 4 80
ECS ingest	Processing • TRMM/CERES • AM1/CERES • AM1/MISR • AM1/MOPITT***** • METEOR/SAGE III • FOO/ACRIM Reprocessing*** • TRMM/CERES • AM1/CERES • AM1/MISR • AM1/MOPITT***** • METEOR/SAGE III***** Other • Migrated V0 data • Ad Hoc data**	Ingests per day 1 from TSDIS 12 from EDOS 12 from EDOS 1 from EDOS 1 1 48 from archive 48 from archive 48 from archive 1 from archive 1 from archive 13 from V0 migration system 96 from miscellaneous sources
ECS product generation	Processing • TRMM/CERES • AM1/CERES • AM1/MISR • AM1/MOPITT • AM1/Subsetting* • METEOR/SAGE III * • FOO/ACRIM Reprocessing • TRMM/CERES • AM1/CERES • AM1/MISR • AM1/Subsetting* • AM1/MOPITT • METEOR/SAGE III****	Hours of product generation 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day 7 days per week, 24 hours/day

Table 5.6.3-1. Activities in the Day in the Life of ECS at LaRC (2 of 2)

Activity	Description	Metrics (daily average)	
ECS archive	Processing	# of Files	Vol. (MB)
	• TRMM/CERES	121	12,185
	• AM1/CERES	75	16,187
	• AM/1Subsetting*	0	0
	• AM1/MISR	1,306	168,637
	• AM1/MOPITT	3	170
	• METEOR/SAGE III	873	133
	• FOO/ACRIM	15	57
	Reprocessing		
	• TRMM/CERES	121	12,185
	• AM1/CERES	75	16,187
	• AM1/MISR	1,306	168,637
	• AM1/Subsetting*	0	0
	• AM1/MOPITT	3	170
	• METEOR/SAGE III	873	133
	Other		
	• Migrated V0 data	13	1,281
	• Ad hoc data**	240	19,865
ECS electronic data distribution through ECS client or web	• User pull • Number of user accesses per day	7 days/week, 24 hours/day 179	
ECS hard media data distribution	• Distribution of hard media	Vol. (MB) 197,369	# of Orders 13
ECS user services	• Staffed hours	5 days/week, 8 hours/day	
ECS operations	Science data production • Staffed hours Other operations • Staffed hours	7 days/week, 24 hours/day 7 days/week, 24 hours/day	
ECS engineering	• Staffed hours	5 days/week, 8 hours/day	

*   Subsetting includes that process that creates the MOD09:SUBS:L3:DY product as part of MISR processing. The Technical Baseline does not show that this product is archived in this form so no archive activity is included. An equivalent load for subsetting of reprocessed MODIS data is also assumed.

**   "Ad Hoc" data are used as a place holder for any miscellaneous files that are archived. Examples include files ingested from hard media or electronically from users/SCFs.

***   "Ingest from archive" means that the data being reprocessed is being pulled from the ECS archive.

****   The Technical Baseline shows a single process. However, because of model implementation characteristics, SAGE III processing is modeled as 80 processes which collectively archive 873 files over time.

*****   Because the number of processing is small, a single ingest and execution sequence per day is assumed.
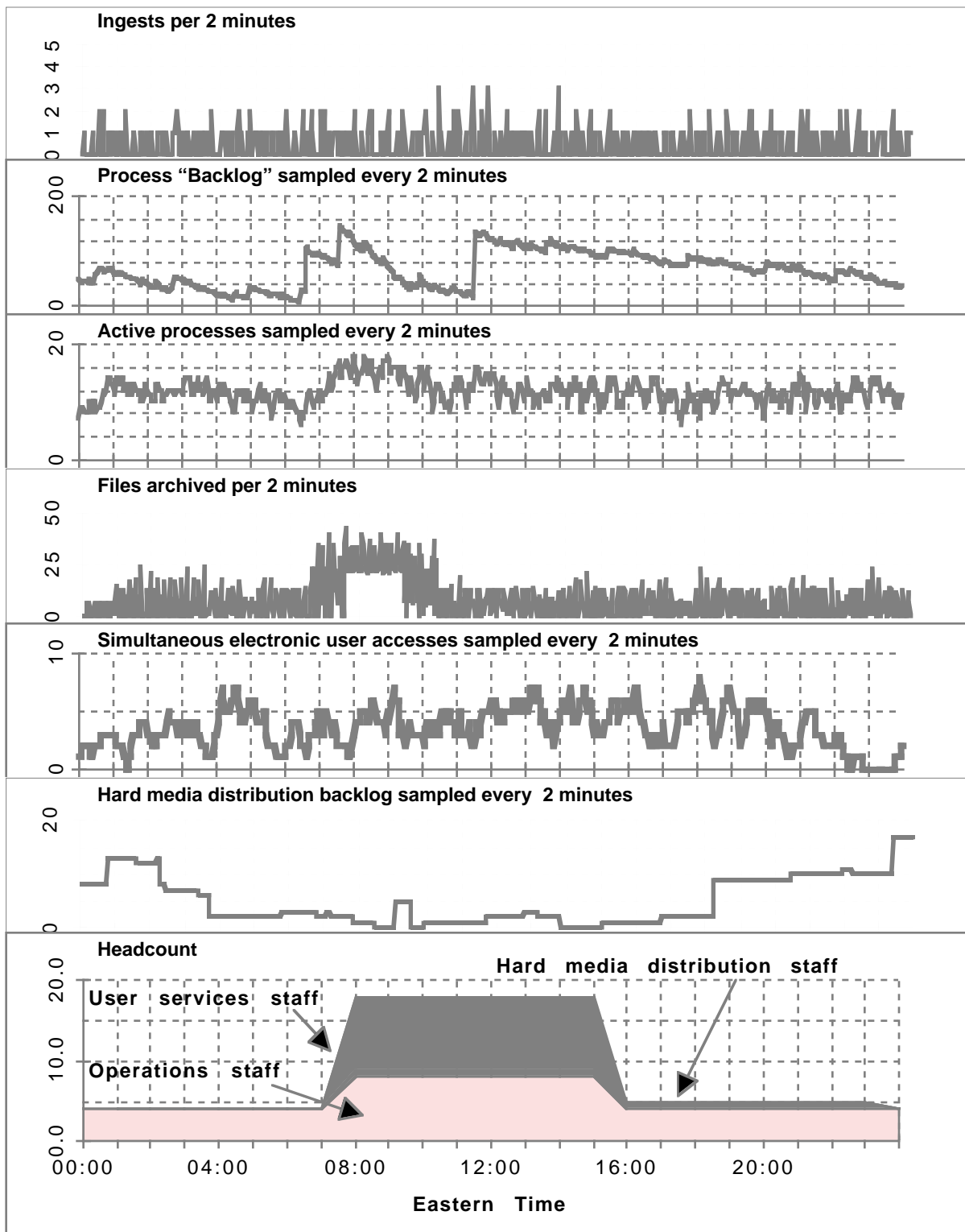
Figure 5.6.3-1. Overview of Day in the Life of ECS at LaRC

Name	1995	1996	1997	1998	1999	2000	2001
B: ECS development milestones		11/1 ▬▬▬▬			9/30		
B: HW installations		11/1 ▭ 6/11					
B: Consent to ship Review			6/1 ◆				
B: Site acceptance testing			6/1 ▮ 9/4				
B: Release Readiness Review			9/1 ◆				
B: Site HW capacity upgrades				5/1 ▮ 7/30			
B: Site capacity upgrades testing				8/1 ▮ 9/30			

Figure 5.6.3-2. LaRC Related Release B Development Milestones

Name	1995	1996	1997	1998	1999	2000	2001
B: Science SW		10/8 ▬▬		2/17			
B: AM-1 MISR mission version SW I&T			11/6 ▮ 12/5				
B: AM-1 MOPITT mission version SW I&T			11/6 ▮ 12/5				
B: AM-1 MISR science SW testing			12/8 ▮ 1/6				
B: AM-1 MOPITT science SW testing			12/8 ▮ 1/6				
B: METEOR mission integration support			11/3 ▮ 12/19				
B: ACRIM mission integration support			12/31	12/31			

Figure 5.6.3-3. LaRC Science SW Activities

Name	1995	1996	1997	1998	1999	2000	2001
B: System integration			9/3 ▼	2/13			
B: V0 interoperability			10/6 ▮ 12/5				
B: IV&V			9/3 ▼	11/20			
B: IV&V: LaRC testing			10/23 ▮ 11/6				
B: I/F integration and test			11/21 ▼	2/13			
B: System integration			11/21 ▼	2/13			
B: SCF - ECS integration			11/21 ▮ 12/17				
B: DAAC - DAAC integration			11/21 ▮ 12/17				
B: ETS - ECS integration			12/18 ▮ 1/1				
B: EDOS-EBNET-ECS integration			1/2 ▮ 2/5				
B: ECS-ancillary data integration			2/6 ▮ 2/13				

Figure 5.6.3-4. LaRC System Integration Activities

Name	1995	1996	1997	1998	1999	2000	2001
B: Mission Readiness			3/3 ▼	6/30			
B: AM-1 S/C end to end			3/3 ▮ 3/9				
B: AM-1 mission ops simulation			3/30 ▮ 4/3				
B: AM-1 operational readiness exercises			4/6 ▮ 6/30				
B: Training and certification			6/1 ▬▬▬	1/15			
B: Operator training (classroom, IATO, IV&V, OJT, etc.)			6/1 ▭ 5/27				
B: Operator certification			5/27 ◆				
B: Mission certification			2/17 ▼ 3/2				
B: AM-1 Landsat-7 EOSDIS Version 2 Baseline Test			2/17 ▮ 3/2				
B: ECS Version 2 Baseline Certification			2/17 ▮ 3/2				

Figure 5.6.3-5. LaRC Mission Readiness, and Training and Certification Activities
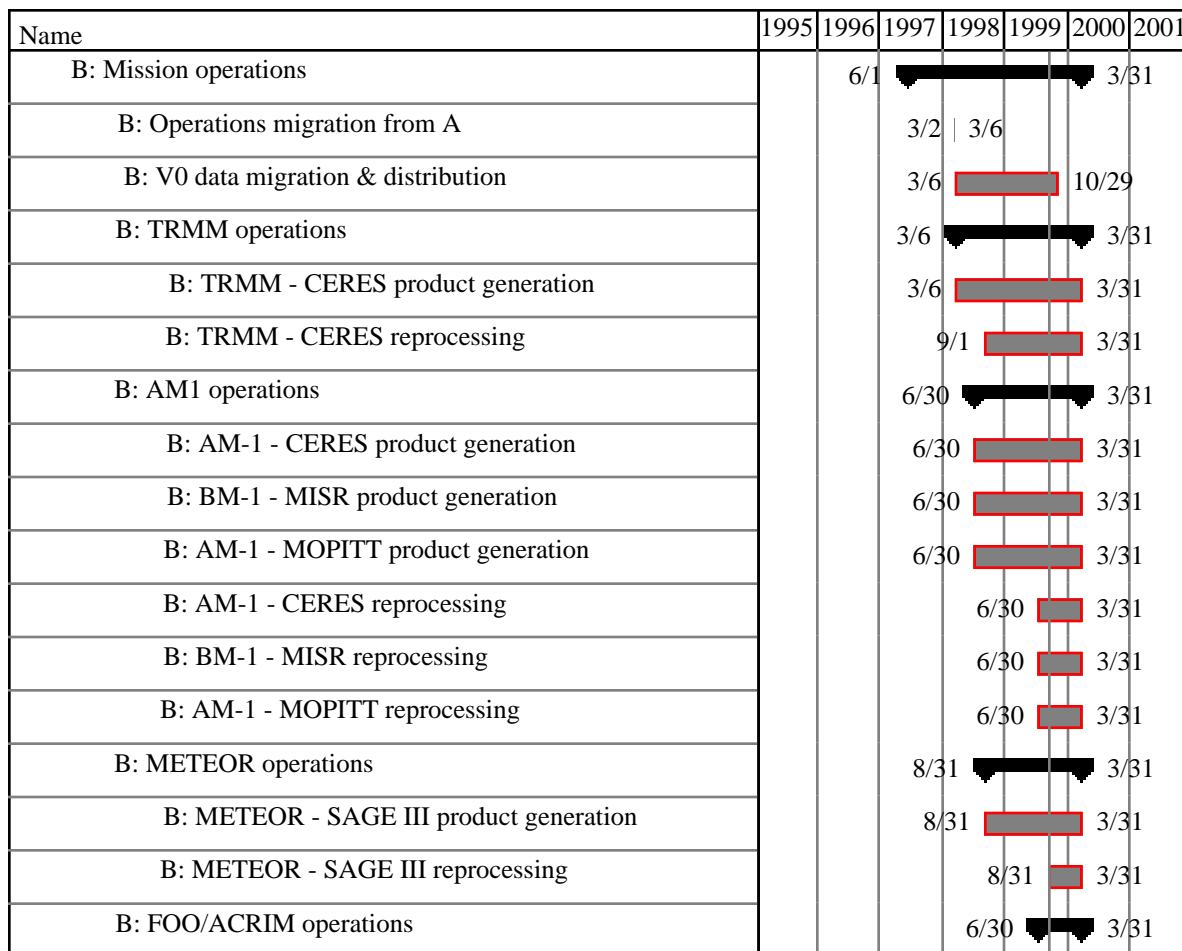
Name	1995	1996	1997	1998	1999	2000	2001
B: Mission operations			6/1 ▬▬▬▬▬▬▬▬ 3/31				
B: Operations migration from A			3/2 ⊦ 3/6				
B: V0 data migration & distribution			3/6 ▭▭▭ 10/29				
B: TRMM operations			3/6 ▬▬▬▬▬▬▬ 3/31				
B: TRMM - CERES product generation			3/6 ▭▭▭▭▭ 3/31				
B: TRMM - CERES reprocessing			9/1 ▭▭▭▭ 3/31				
B: AM1 operations			6/30 ▬▬▬▬▬ 3/31				
B: AM-1 - CERES product generation			6/30 ▭▭▭▭ 3/31				
B: BM-1 - MISR product generation			6/30 ▭▭▭▭ 3/31				
B: AM-1 - MOPITT product generation			6/30 ▭▭▭▭ 3/31				
B: AM-1 - CERES reprocessing				6/30 ▭▭ 3/31			
B: BM-1 - MISR reprocessing				6/30 ▭▭ 3/31			
B: AM-1 - MOPITT reprocessing				6/30 ▭▭ 3/31			
B: METEOR operations			8/31 ▬▬▬▬ 3/31				
B: METEOR - SAGE III product generation			8/31 ▭▭▭▭ 3/31				
B: METEOR - SAGE III reprocessing				8/31 ▭ 3/31			
B: FOO/ACRIM operations				6/30 ▬▬ 3/31			

Figure 5.6.3-6. LaRC Mission Operations Activities

Name	1995	1996	1997	1998	1999	2000	2001
B: ECS maintenance and sustaining engineering		9/1 ▬▬▬▬▬▬ 3/31					
B: Operations readiness and performance assurance		9/1 ▭▭▭▭▭ 3/31					
B: Sustaining engineering		9/1 ▭▭▭▭▭ 3/31					
B: Property management, HW maintenance and ILS		9/1 ▭▭▭▭▭ 3/31					
B: Resource planning and performance analysis		9/1 ▭▭▭▭▭ 3/31					
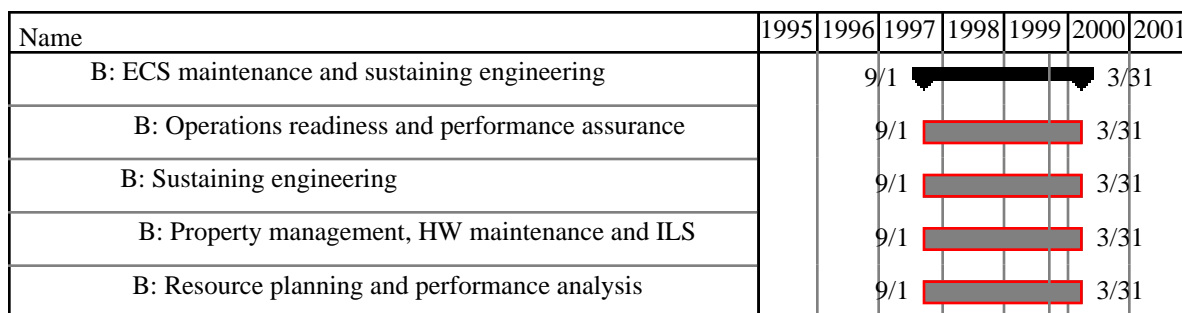
Figure 5.6.3-7. LaRC Maintenance and Sustaining Engineering Activities

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Name	1995	1996	1997	1998	1999	2000	2001
C: ECS development milestones				2/1		4/1	
C: HW installations				2/1	7/30		
C: Consent to Ship Review				11/1			
C: ECS independent acceptance testing				11/1	12/1		
C: Release Readiness Review				11/1			
C: Operations transition (estimated)				4/1			

Figure 5.6.3-8. LaRC Related Release C Development Milestones

5.6.3.1 LaRC Production Operations

This section provides an end of day view of processing and reprocessing of TRMM/CERES, AM1/CERES, AM1/MISR, AM1/MOPITT, METEOR/SAGE III, and FOO/ACRIM (exception: FOO/ACRIM does not include reprocessing since it is within one year of launch) products. Two sets of data are shown for the processing and reprocessing production:

- Process backlog. A process goes into a "backlog" state when data is ingested and its processing can be scheduled as a result of that ingest. For example, the TRMM/CERES data is ingested once a day. This model assumes that all processes go into a "backlog" state then. A process may be one or more PGEs.

- Active Processes. The model assumes that two strings are available for use. The average time required for a process to complete is determined by dividing the number of processes executed in a day by the number of hours of production. The model assumes that each string can execute one or more processes in the two minute time step. The model also assumes that excess capacity is available and each process completes faster than the average as shown below:

  - One third faster for TRMM/CERES, AM1/CERES, AM1/MISR, and AM1/Subsetting.

  - Ten times faster for AM1/MOPITT, METEOR/SAGE III and FOO/ACRIM.

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Start of day process backlog: 33
Number of processes completed: 105
End of day process backlog: 27
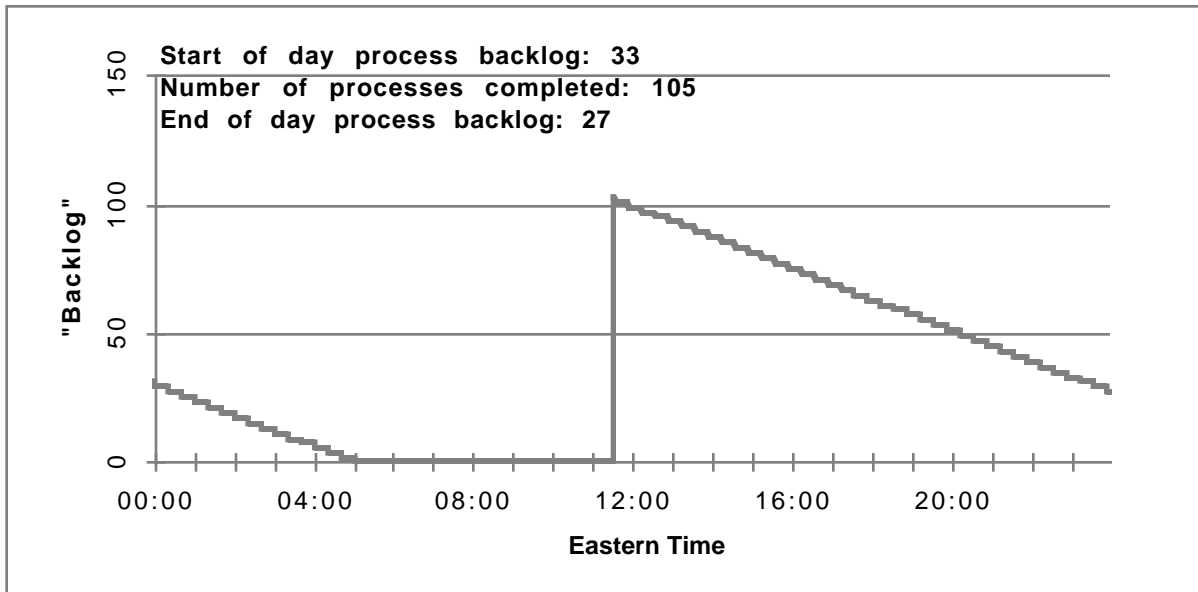
Figure 5.6.3.1-1. LaRC TRMM/CERES Processing Process Backlog
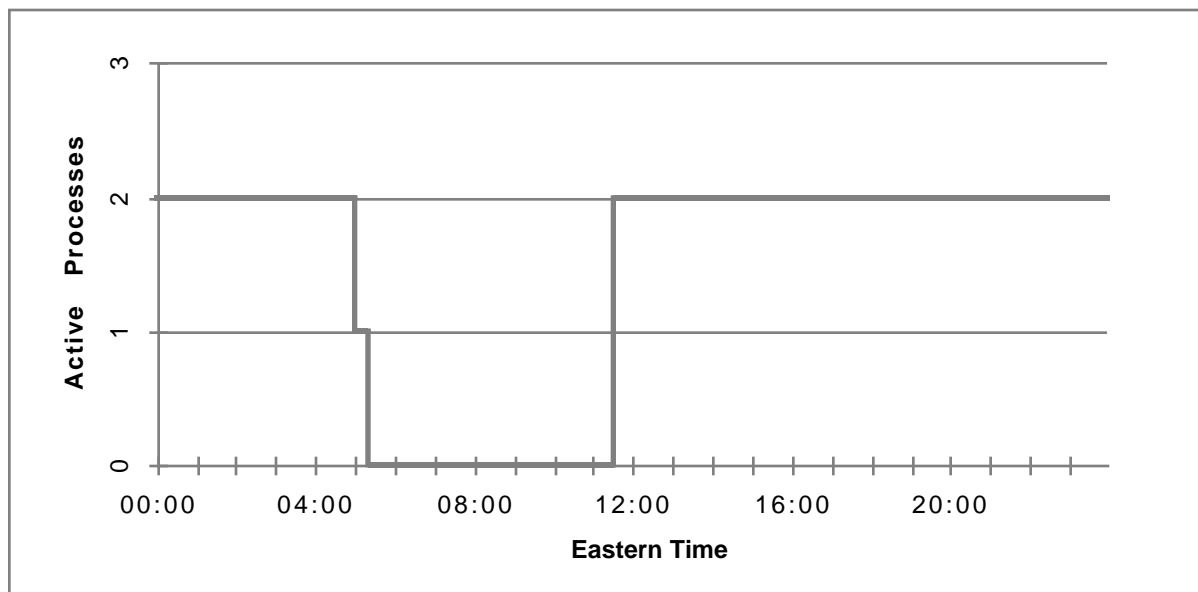
Figure 5.6.3.1-2. LaRC TRMM/CERES Processing Active Processes
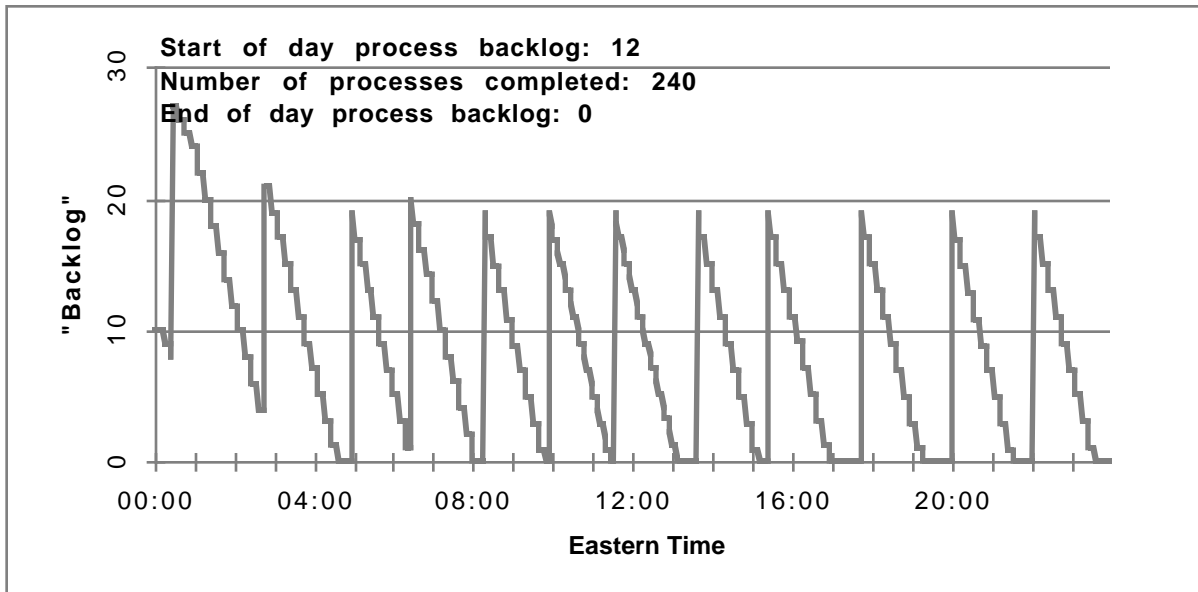
Start of day process backlog: 6
Number of processes completed: 111
End of day process backlog: 0
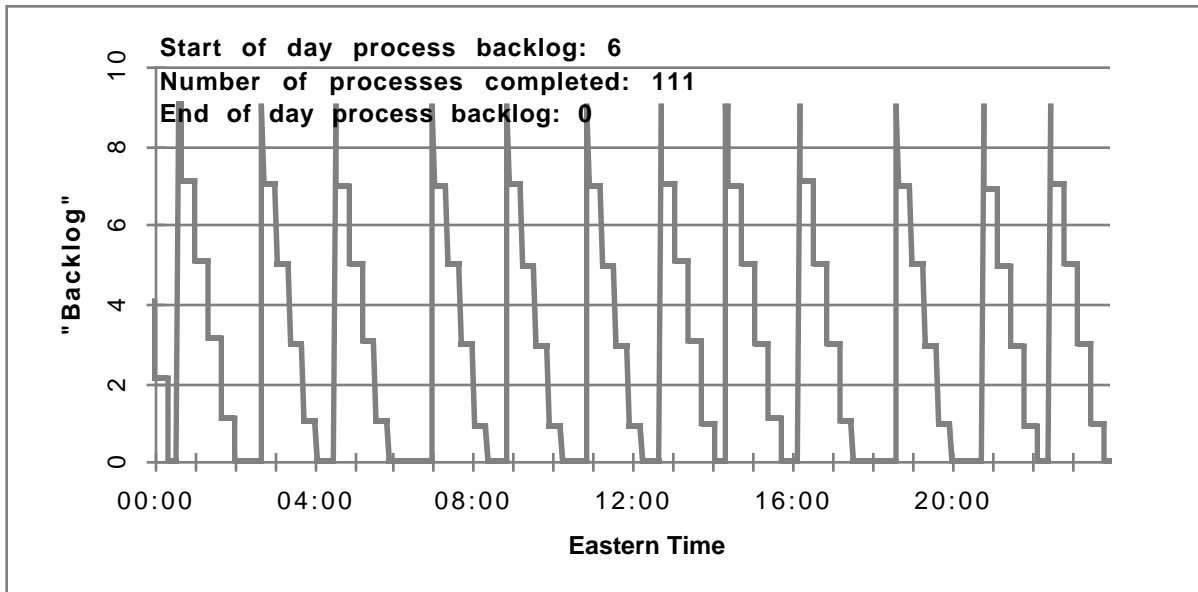
Figure 5.6.3.1-3. LaRC AM-1/CERES Processing Process Backlog
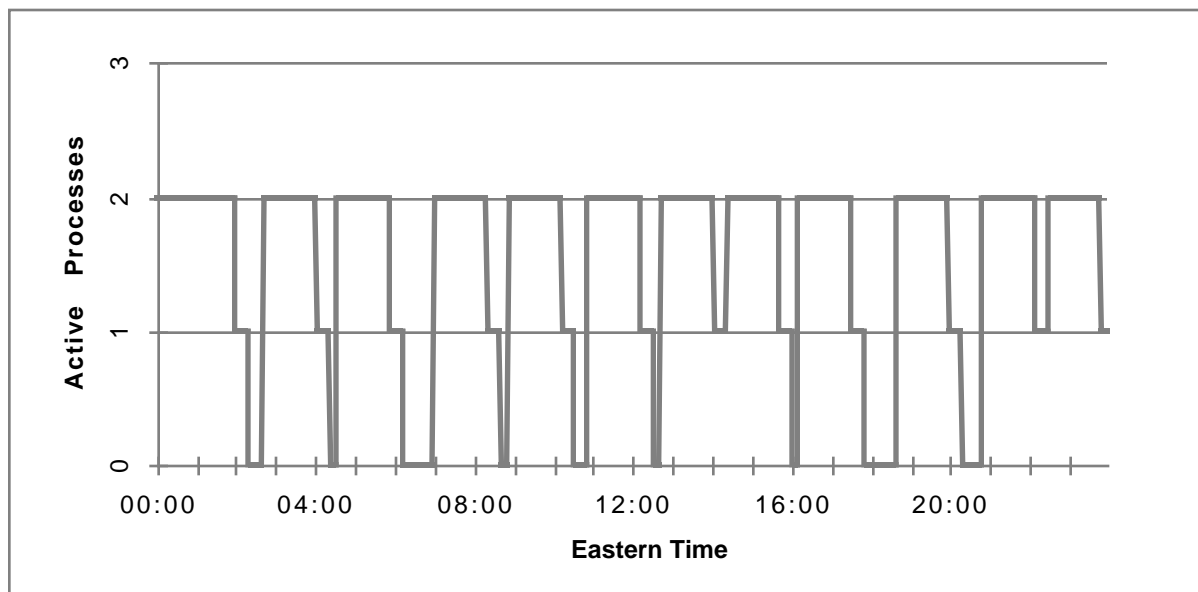
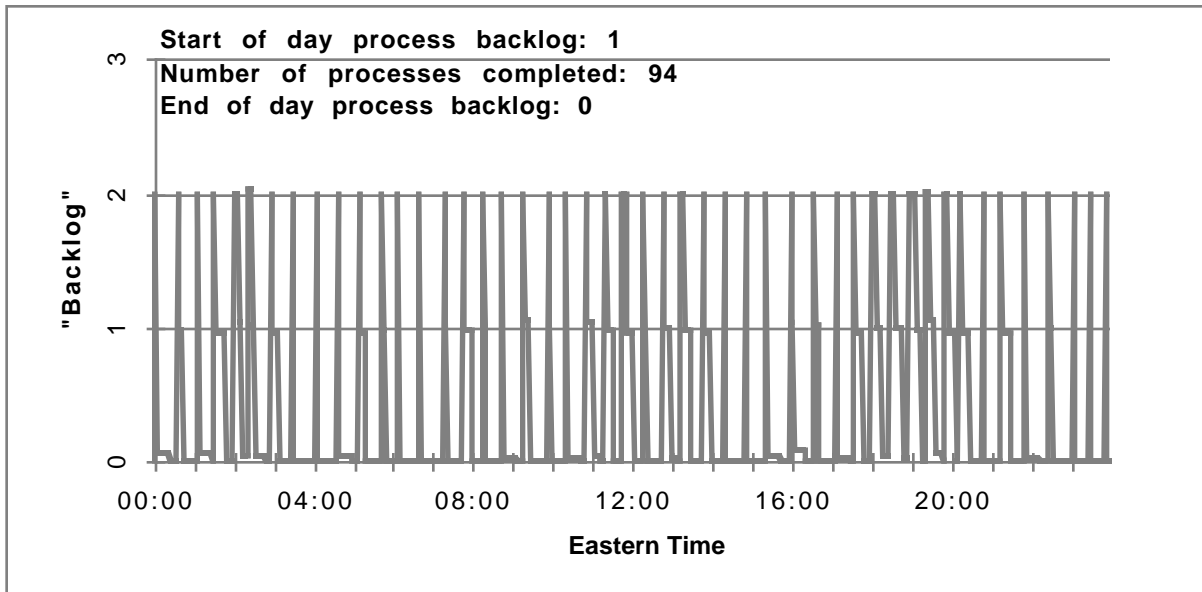*Figure 5.6.3.1-4. LaRC AM-1/CERES Processing Active Processes*

Start of day process backlog: 12
Number of processes completed: 240
End of day process backlog: 0

Figure 5.6.3.1-5. LaRC AM-1/MISR Processing Process Backlog
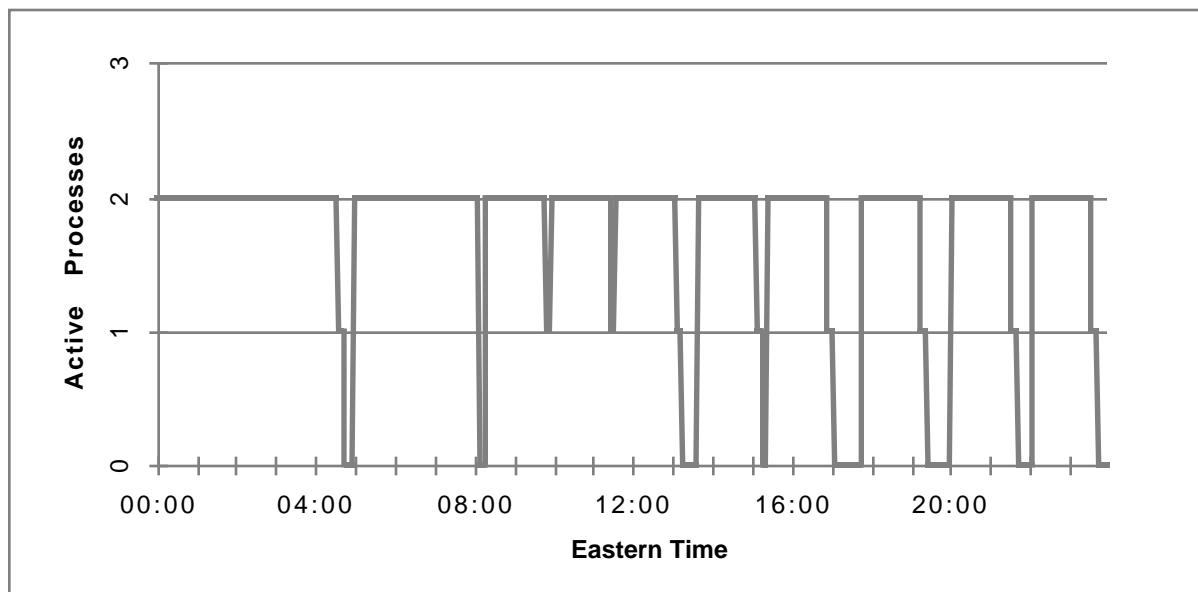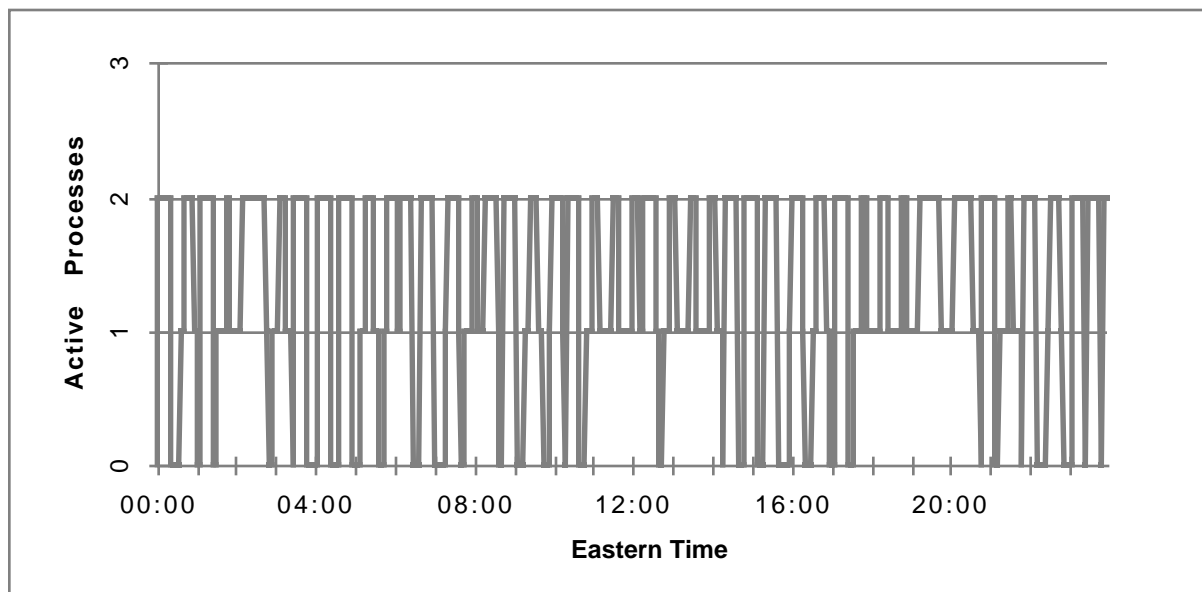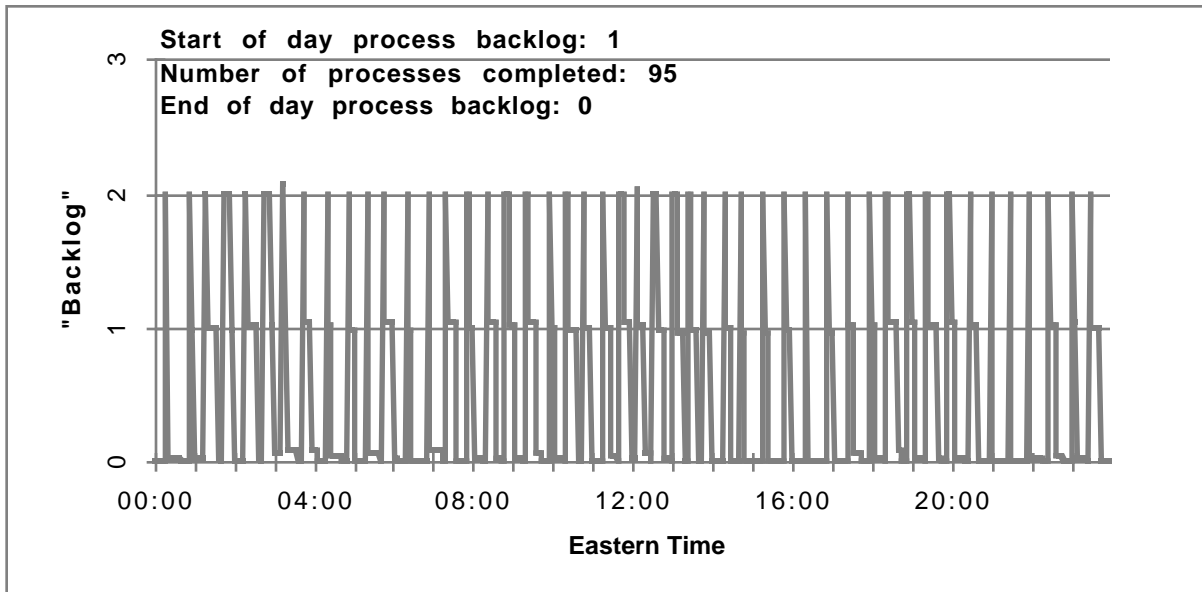

Figure 5.6.3.1-6. LaRC AM-1/MISR Processing Active Processing
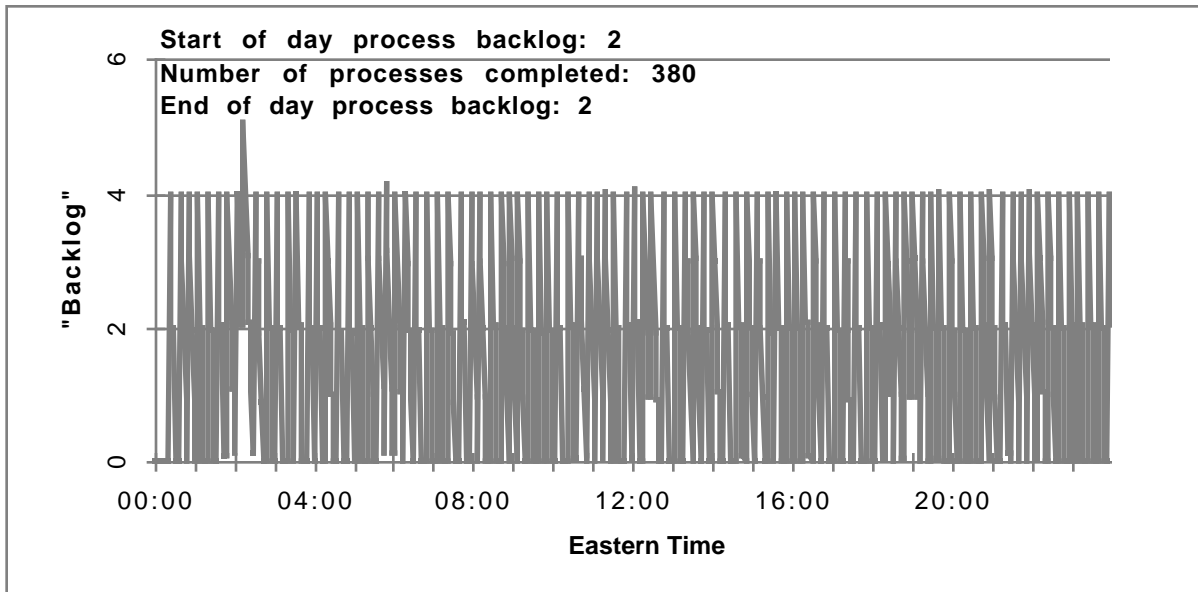
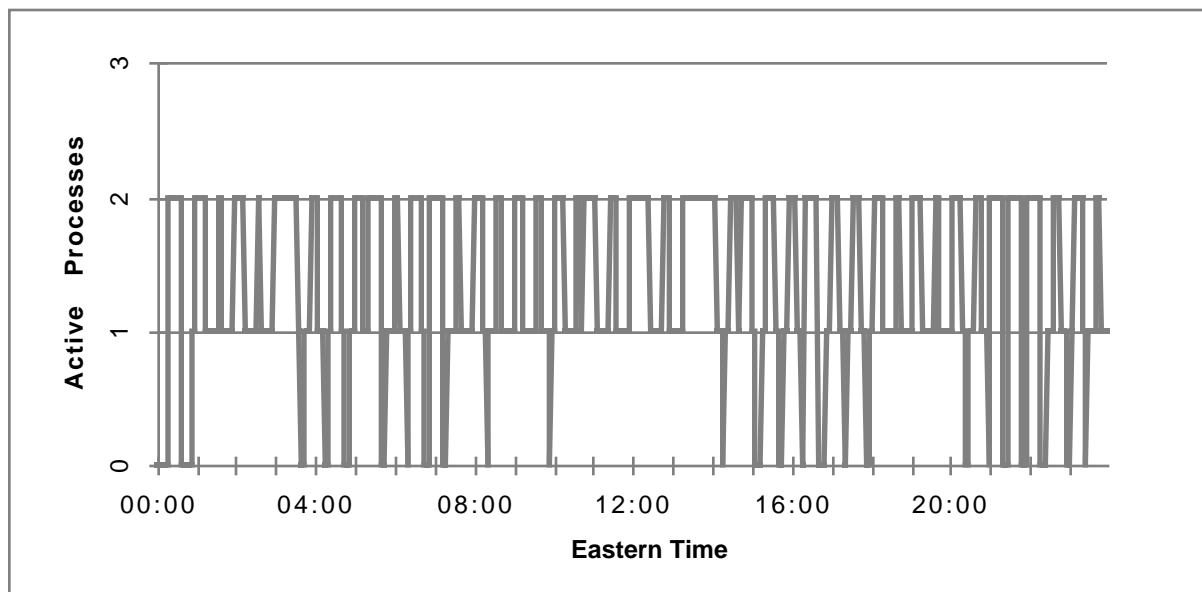*Figure 5.6.3.1-7. LaRC AM-1/Subsetting Processing Process Backlog*
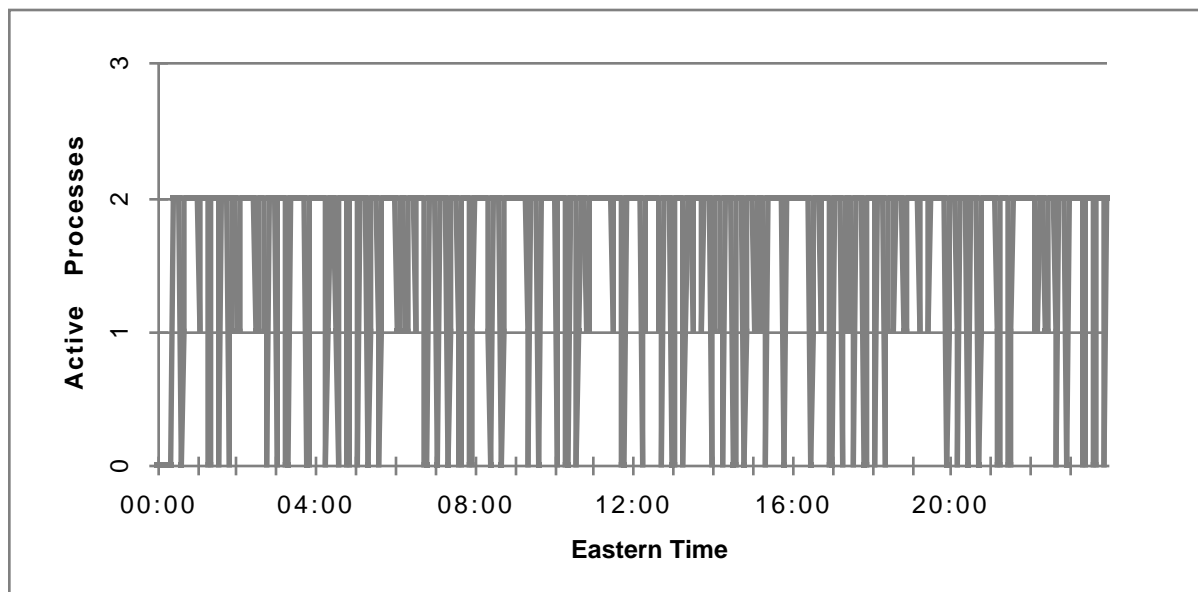
Figure 5.6.3.1-8. LaRC AM-1/Subsetting Processing Active Processes

Start of day process backlog: 0
Number of processes completed: 4
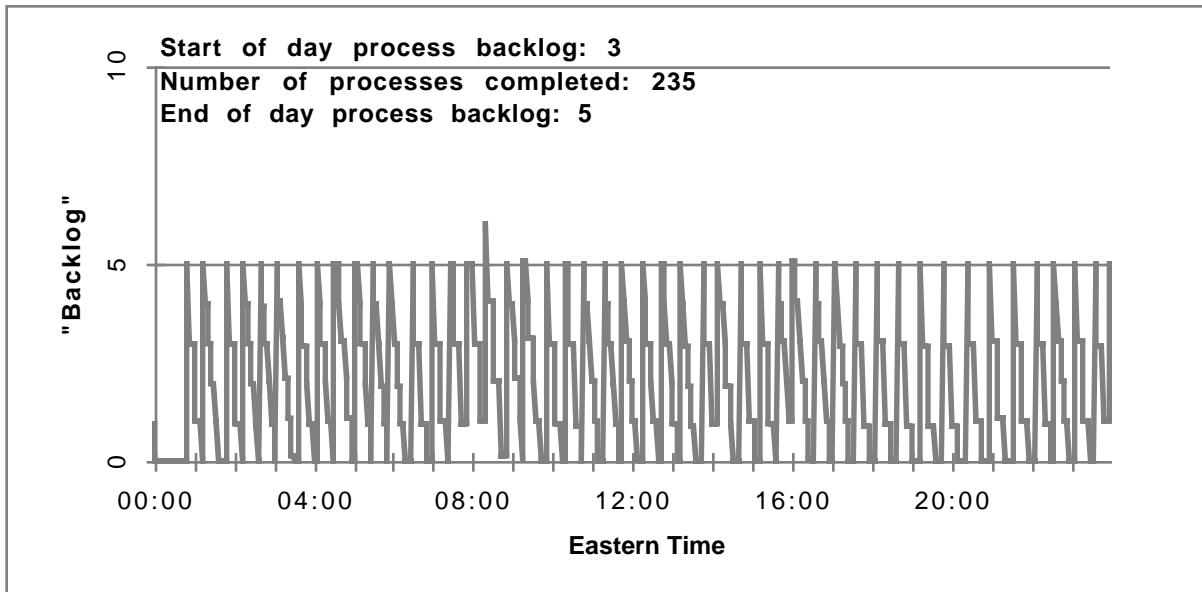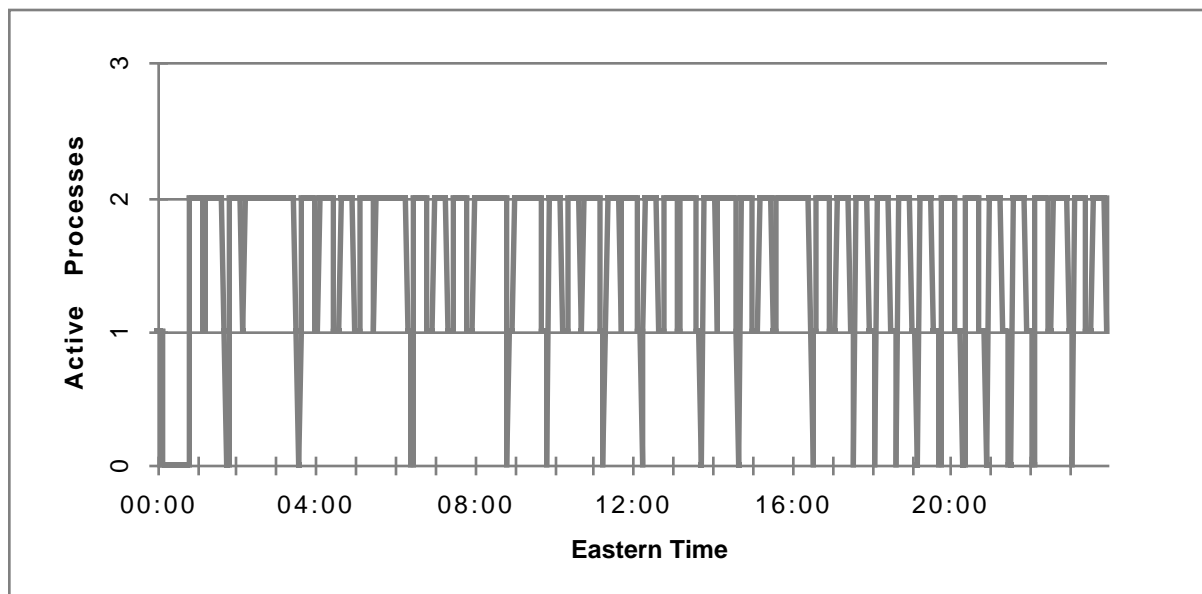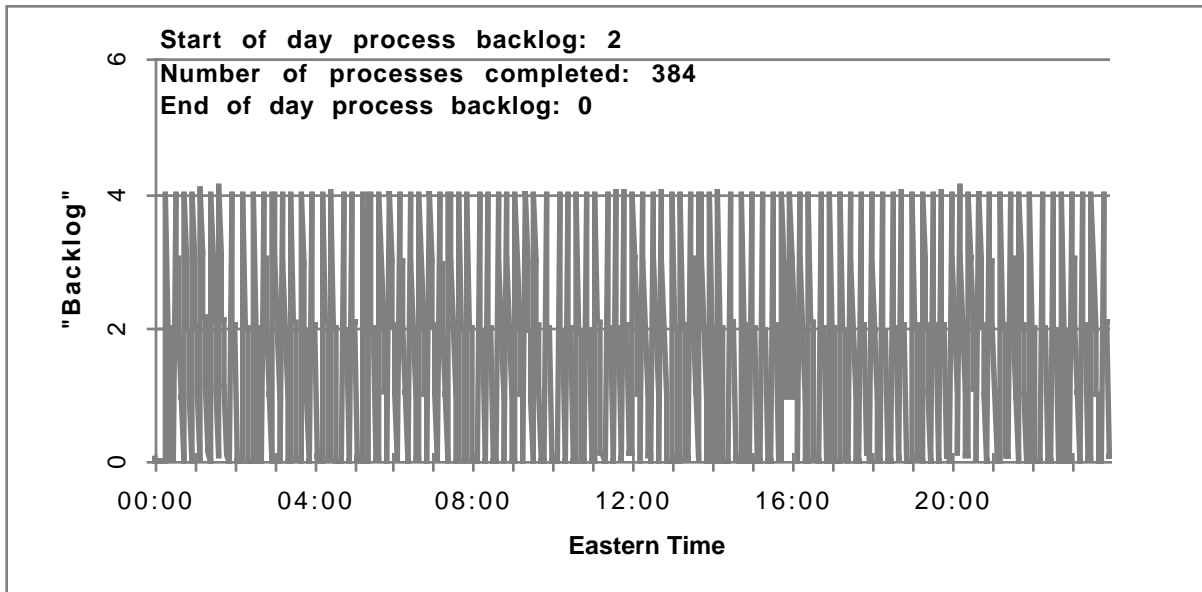End of day process backlog: 0
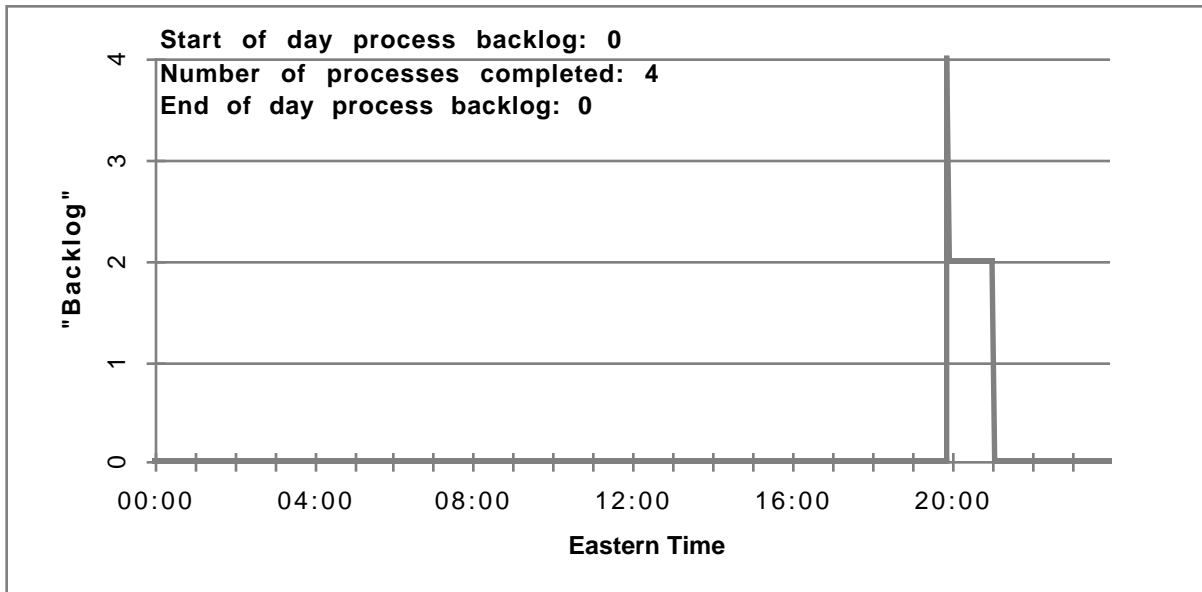
Figure 5.6.3.1-9. LaRC AM-1/MOPITT Processing Process Backlog
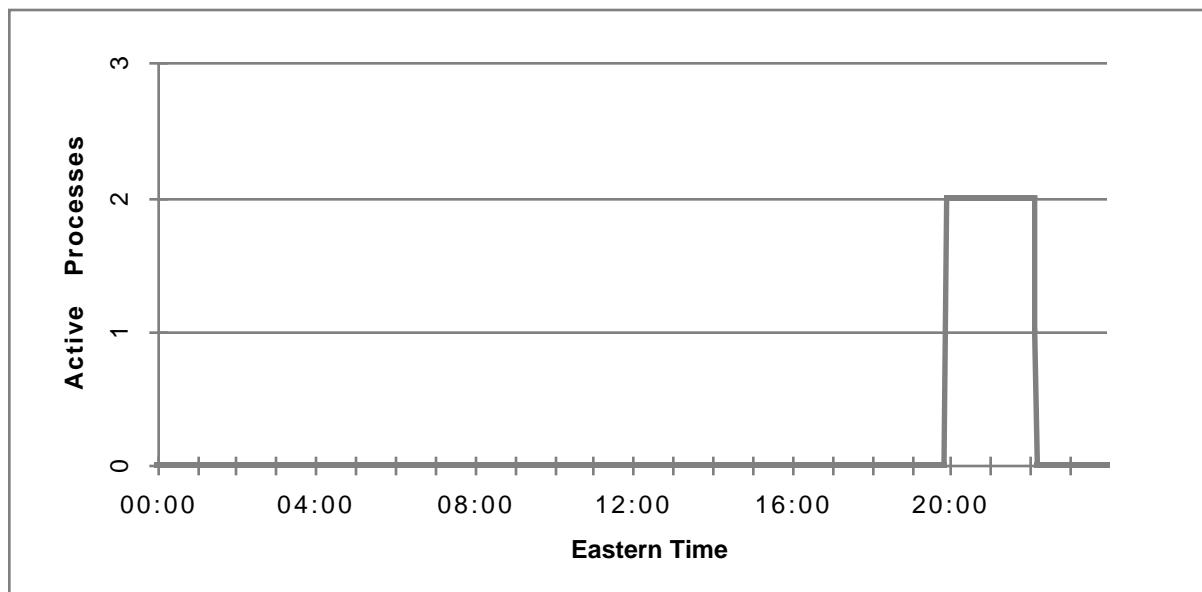
Figure 5.6.3.1-10. LaRC AM-1/MOPITT Processing Active Processes
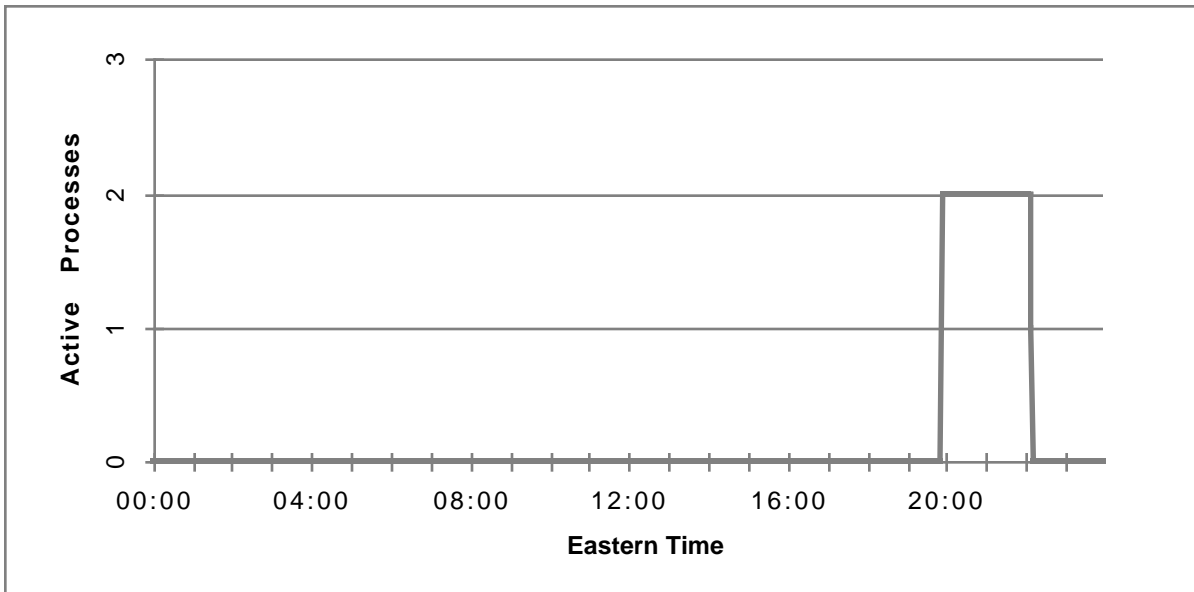
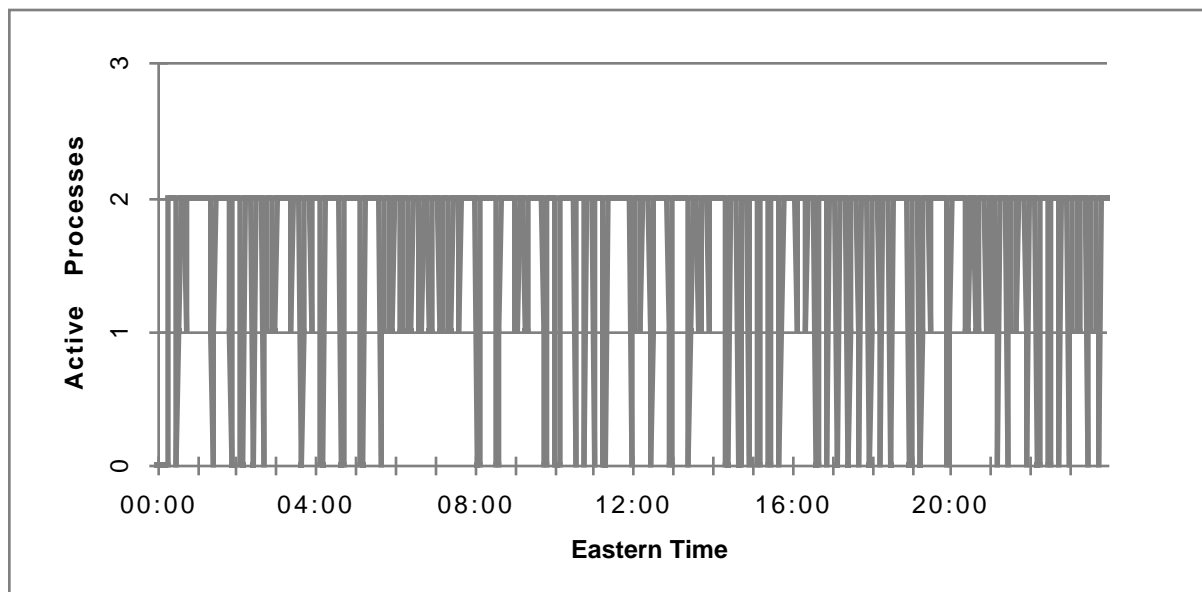**Figure 5.6.3.1-11. LaRC METEOR/SAGE III Processing Process Backlog**
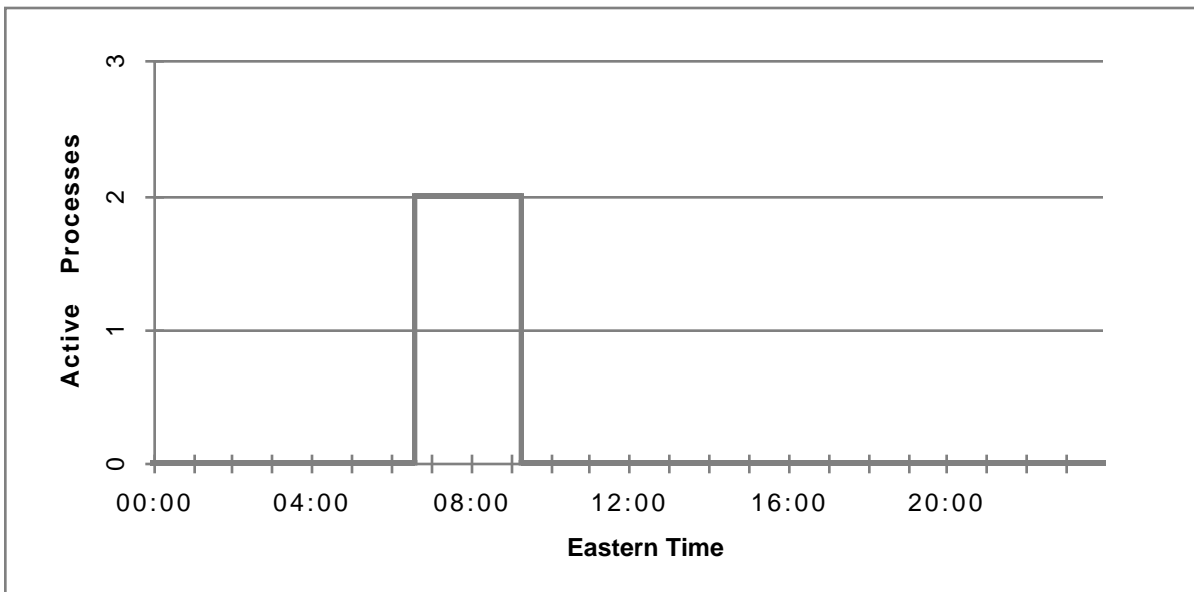
Figure 5.6.3.1-12. LaRC METEOR/SAGE III Processing Active Processes

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Start of day process backlog: 1
Number of processes completed: 15
End of day process backlog: 0
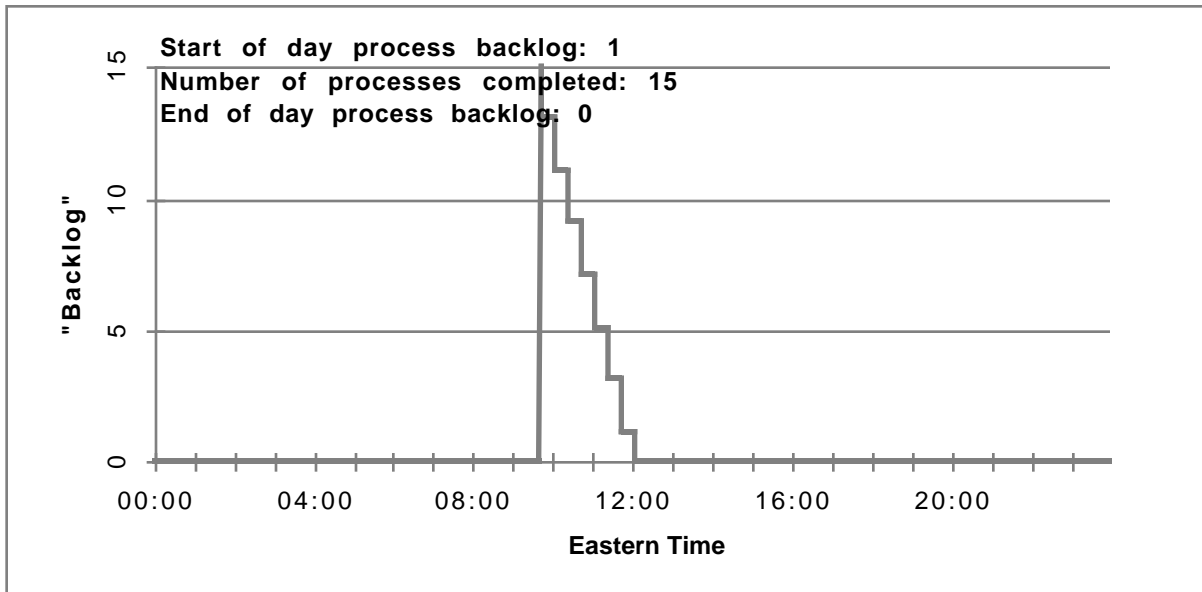
Figure 5.6.3.1-13. LaRC FOO/ACRIM Processing Process Backlog
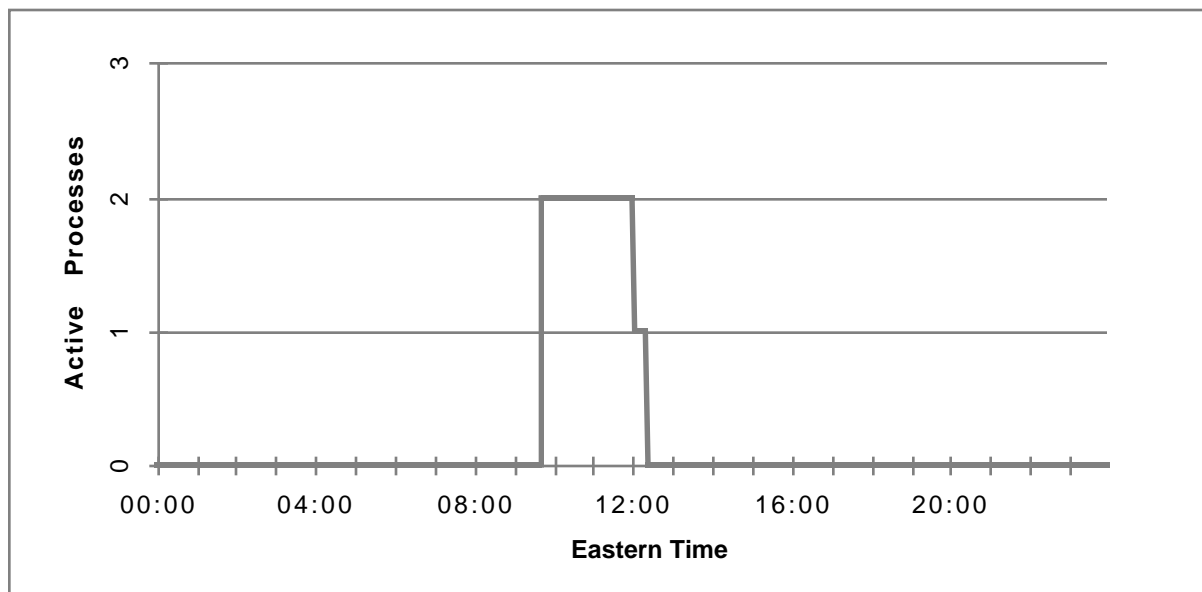
Figure 5.6.3.1-14. LaRC FOO/ACRIM Processing Active Processes

604-CD-002-003

Start of day process backlog: 1
Number of processes completed: 94
End of day process backlog: 0

Figure 5.6.3.1-15. LaRC TRMM/CERES Reprocessing Process Backlog

Figure 5.6.3.1-16. LaRC TRMM/CERES Reprocessing Active Processes

Start of day process backlog: 1
Number of processes completed: 95
End of day process backlog: 0

Figure 5.6.3.1-17. LaRC AM-1/CERES Reprocessing Process Backlog

Figure 5.6.3.1-18. LaRC AM-1/CERES Reprocessing Active Processes

Start of day process backlog: 3
Number of processes completed: 235
End of day process backlog: 5

Figure 5.6.3.1-19. LaRC AM1/MISR Reprocessing Process Backlog
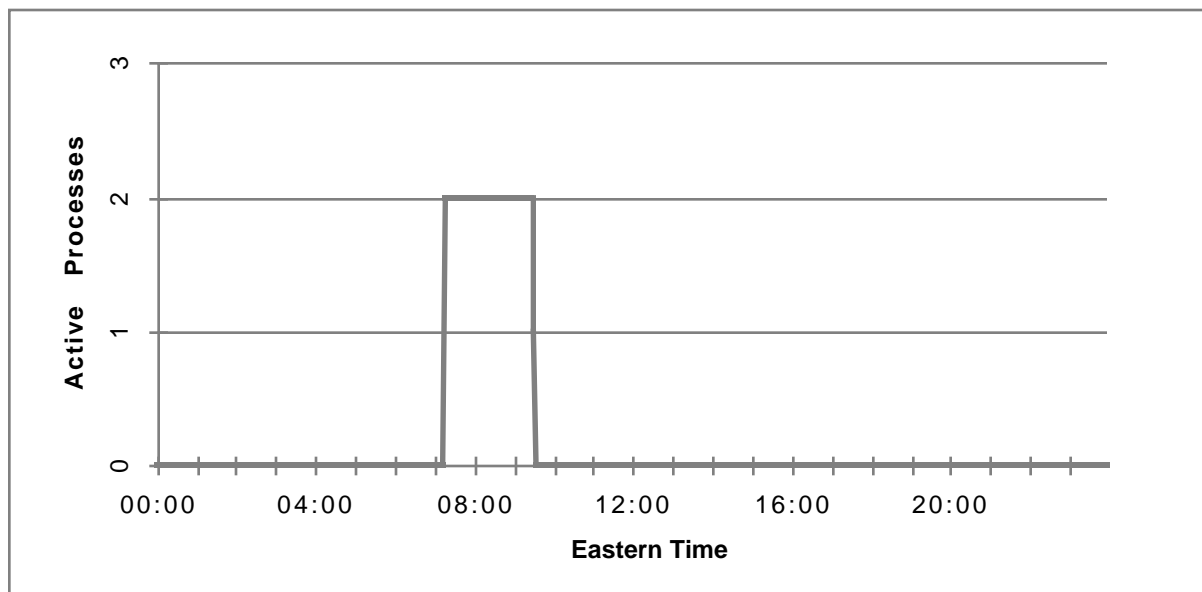

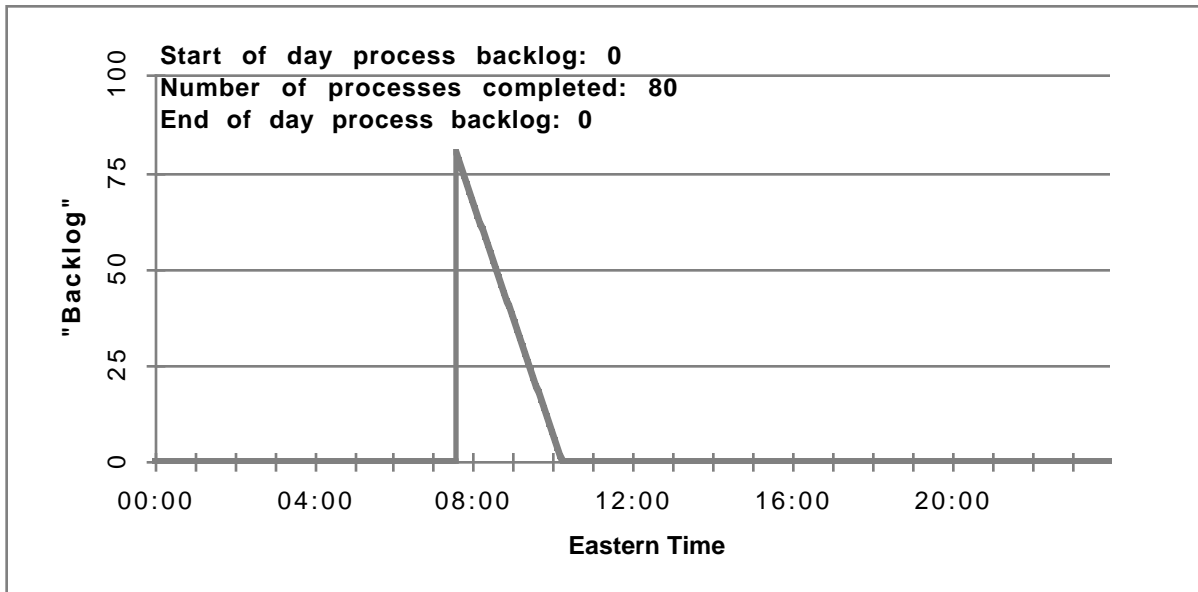*Figure 5.6.3.1-20. LaRC AM1/MISR Reprocessing Active Processes*

Figure 5.6.3.1-21. LaRC AM1/Subsetting Reprocessing Processing Backlog

Figure 5.6.3.1-22. LaRC AM1/Subsetting Reprocessing Active Processes

Start of day process backlog: 0
Number of processes completed: 4
End of day process backlog: 0
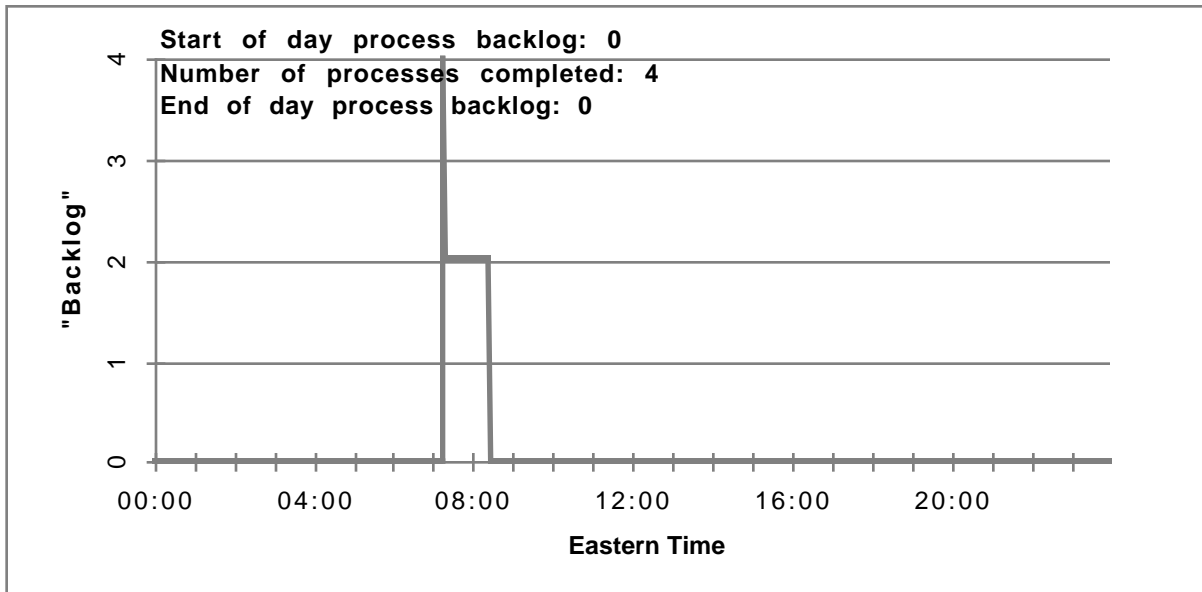
Figure 5.6.3.1-23. LaRC AM1/MOPITT Reprocessing Process Backlog

Figure 5.6.3.1-24. LaRC AM1/MOPITT Reprocessing Active Processes

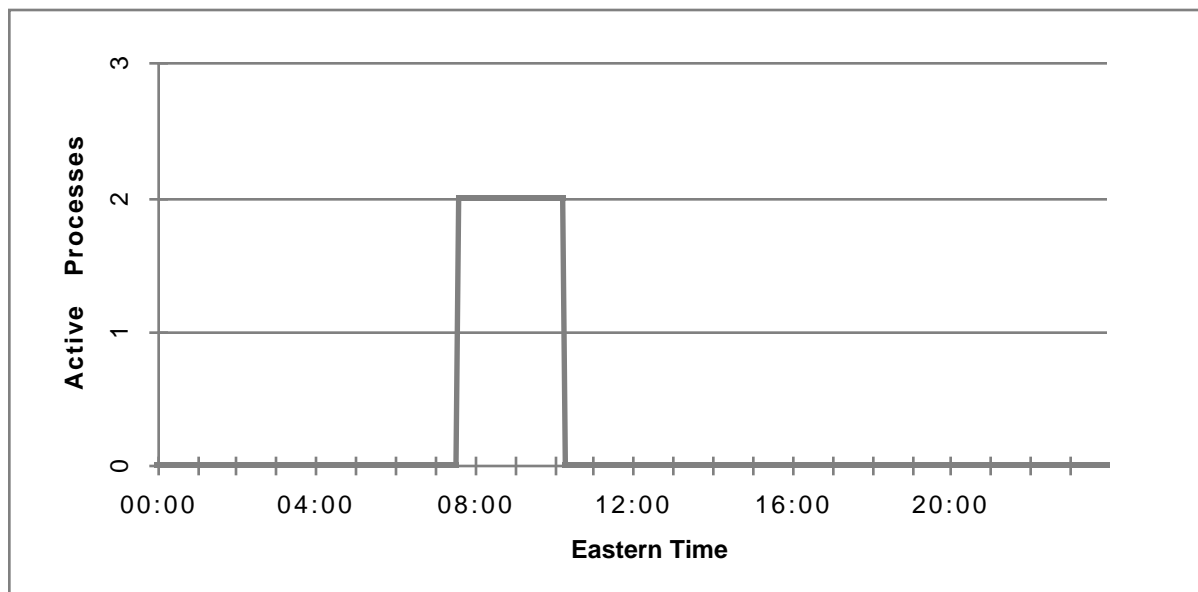*Figure 5.6.3.1-25. LaRC METEOR/SAGE III Reprocessing Process Backlog*

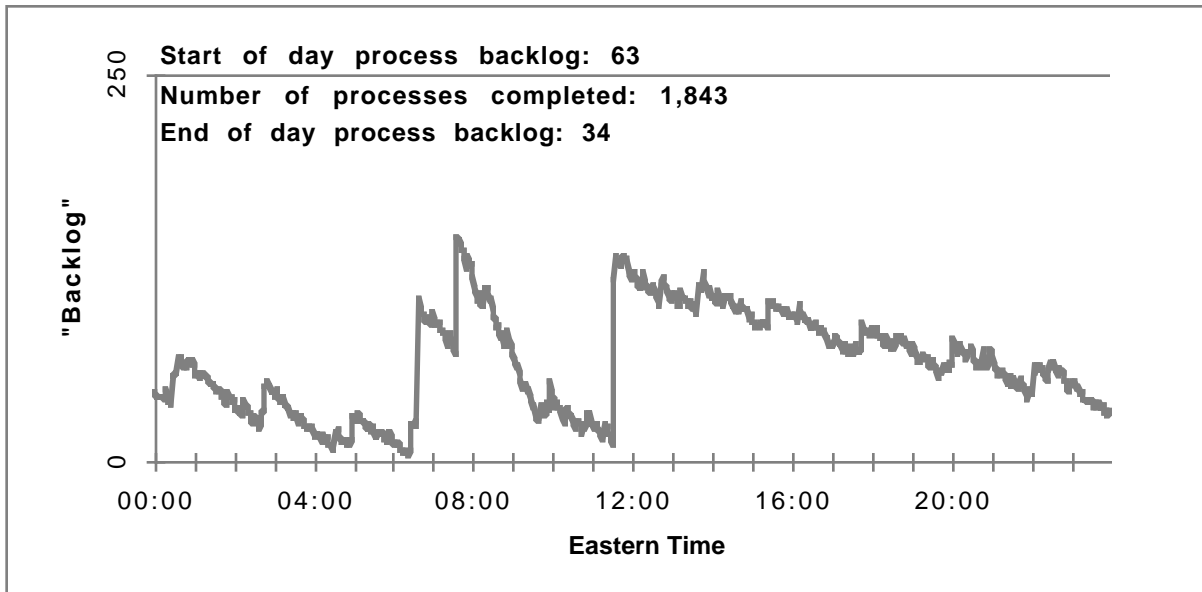*Figure 5.6.3.1-26. LaRC METEOR/SAGE III Reprocessing Active Processes*

Start of day process backlog: 63
Number of processes completed: 1,843
End of day process backlog: 34
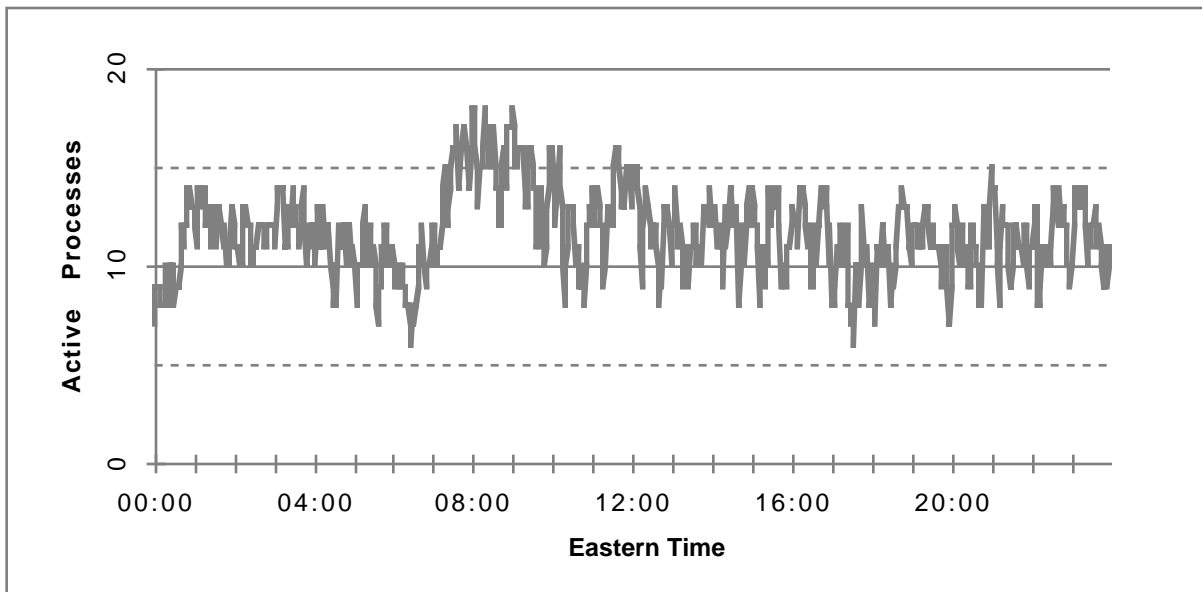
Figure 5.6.3.1-27. LaRC Composite Process Backlog

Figure 5.6.3.1-28. LaRC Composite Active Processes

5.6.3.2 LaRC Archive Operations

The Production Monitor/QA monitors the insertion of files into the archive. The figures in this section show the archive writes for activities shown in Table 5.6.3-1.
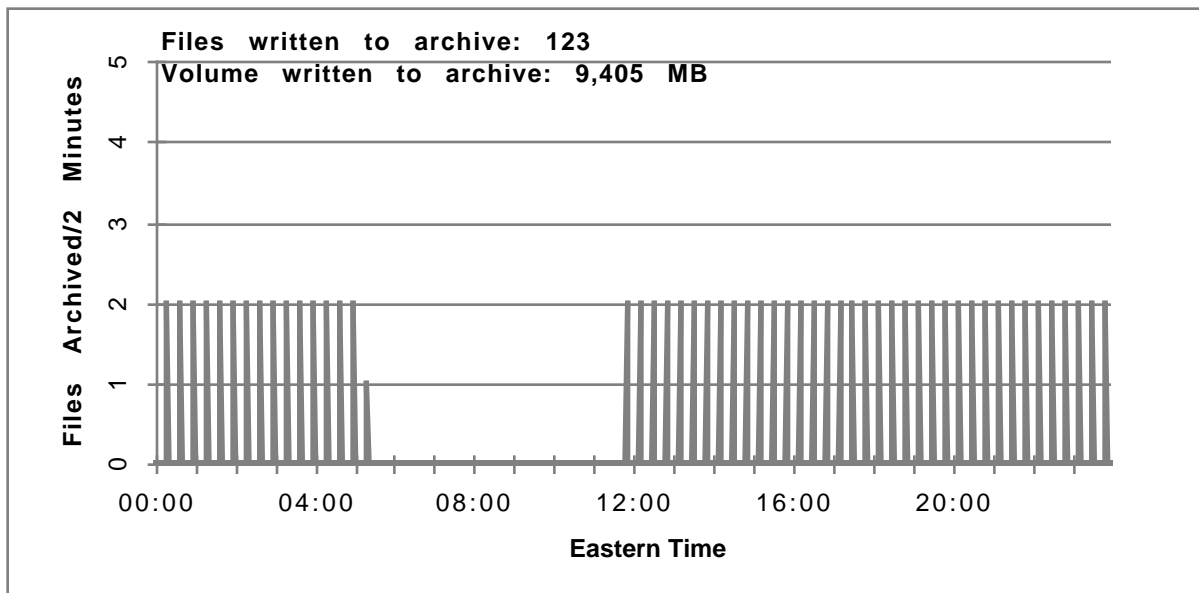

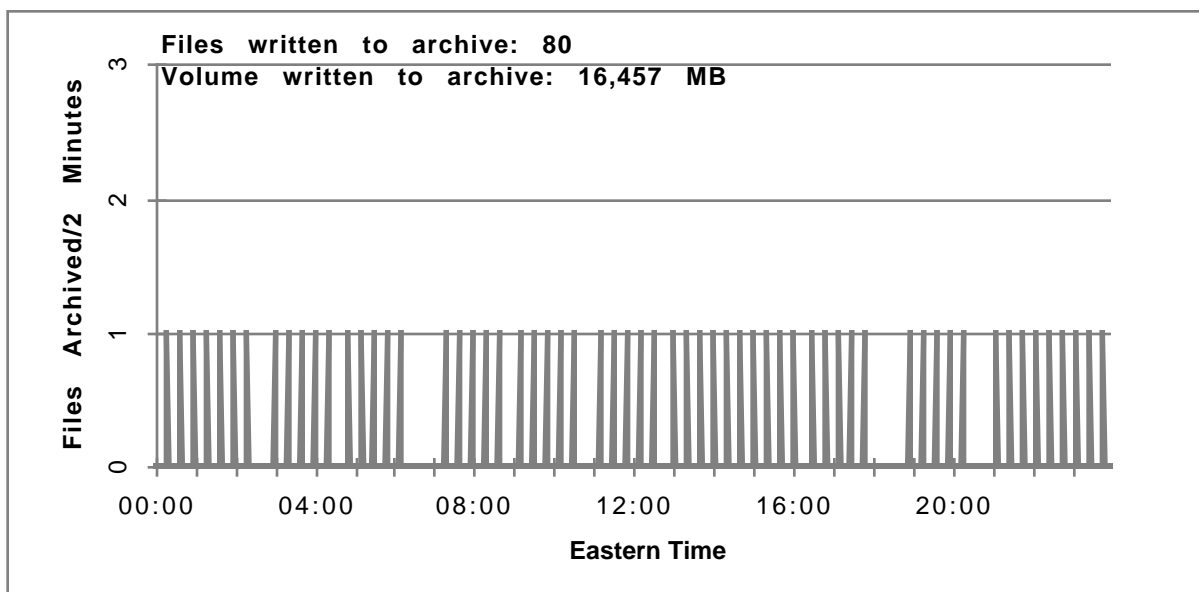*Figure 5.6.3.2-1. LaRC TRMM/CERES Routine Product Archive Write Operations*

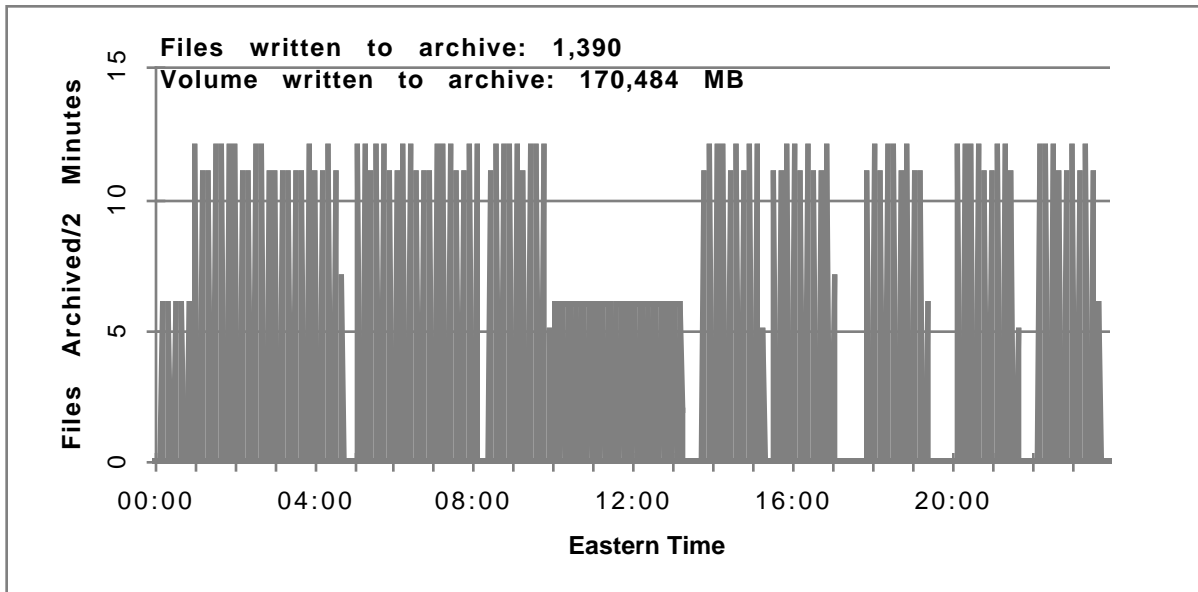*Figure 5.6.3.2-2. LaRC AM1/CERES Routine Product Archive Write Operations*

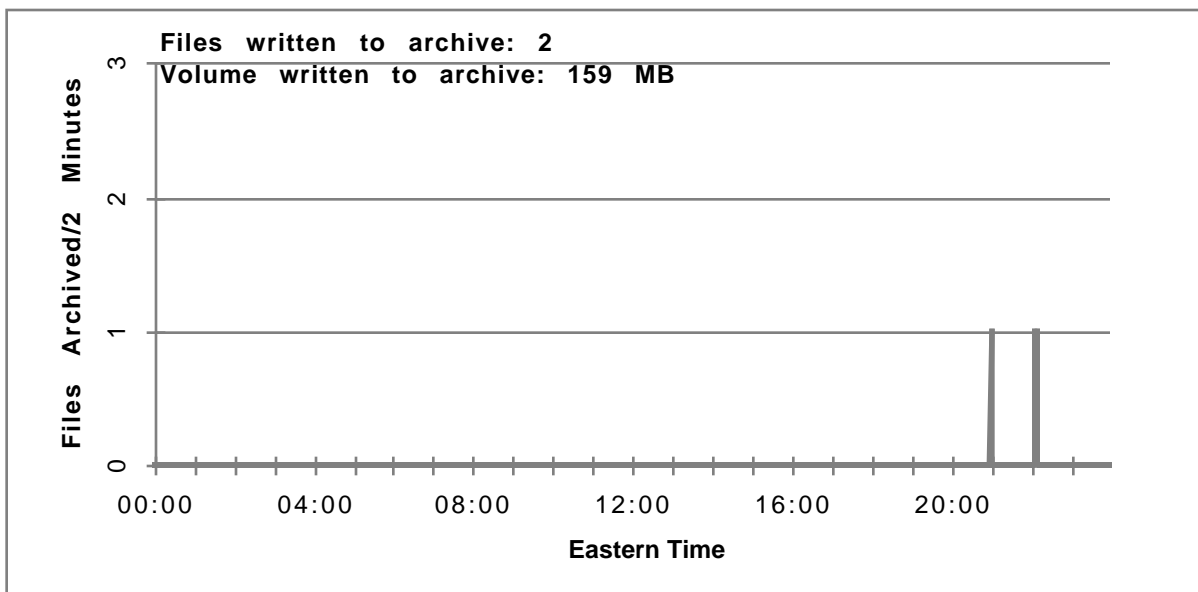*Figure 5.6.3.2-3. LaRC AM1/MISR Routine Product Archive Write Operations*

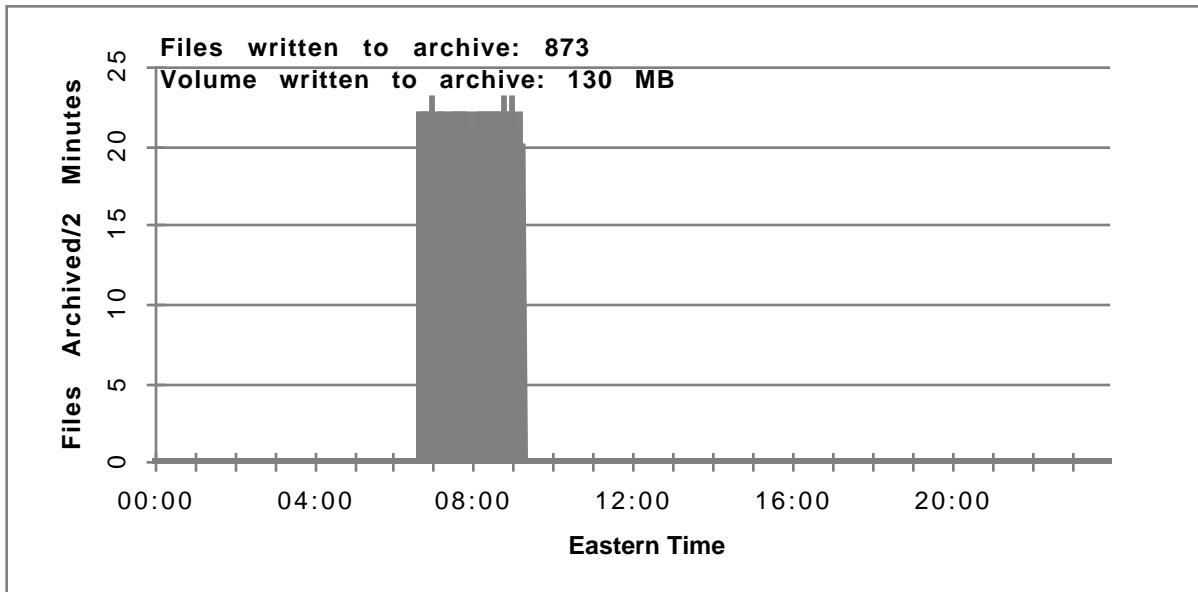*Figure 5.6.3.2-4. LaRC AM1/MOPITT Product Archive Write Operations*

Files written to archive: 873
Volume written to archive: 130 MB

Figure 5.6.3.2-5. LaRC METEOR/SAGE III Routine Product Archive Write Operations

Files written to archive: 15
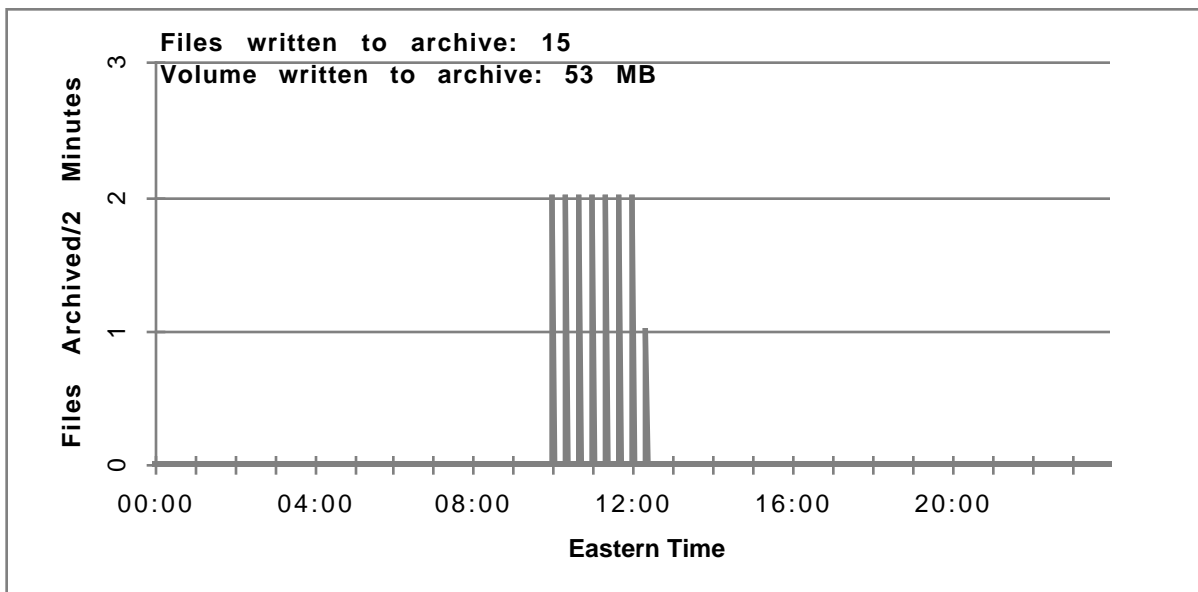**Volume written to archive: 53 MB**

Figure 5.6.3.2-6. LaRC FOO/ACRIM Routine Product Archive Write Operations
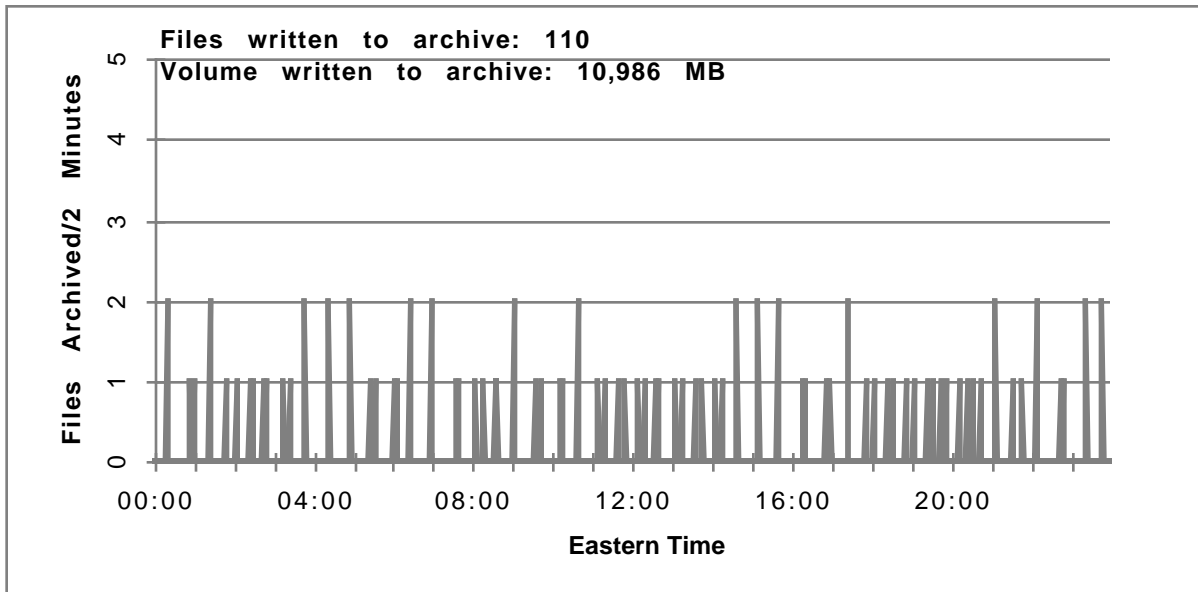
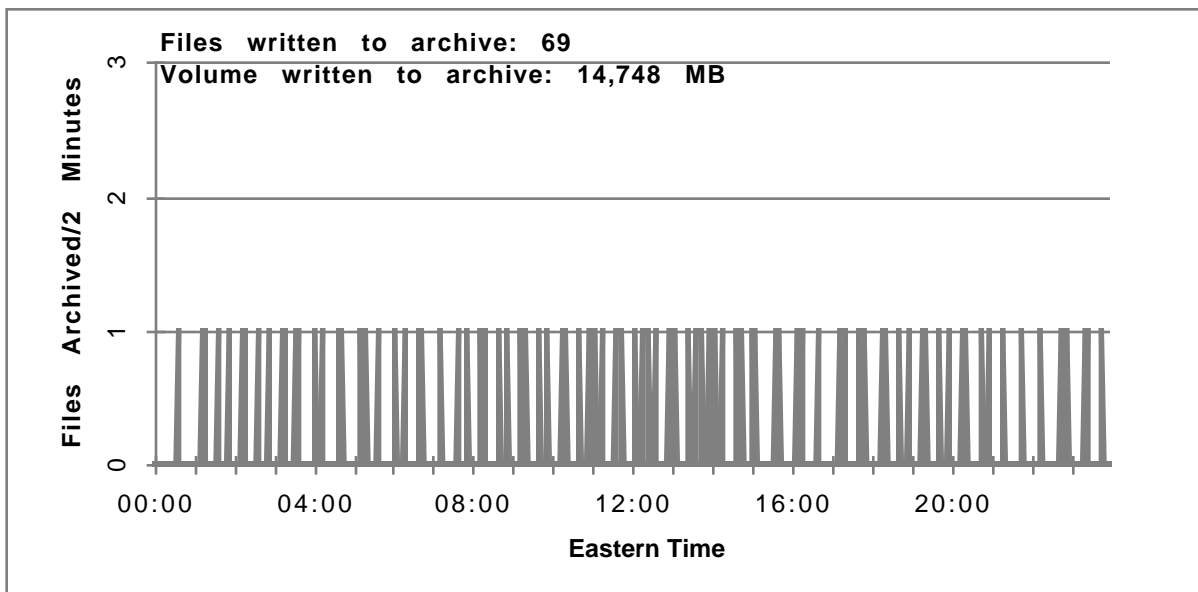*Figure 5.6.3.2-7. LaRC TRMM/CERES Reprocessing Product Archive Write Operations*

Figure 5.6.3.2-8. LaRC AM1/CERES Reprocessing Product Archive Write Operations
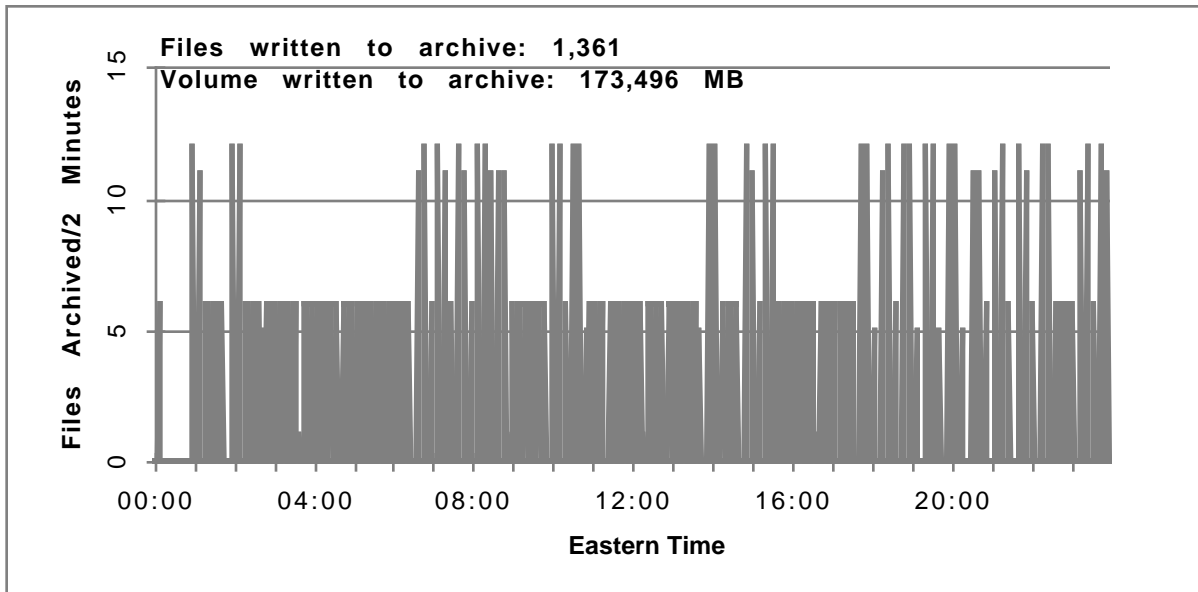
604-CD-002-003

Figure 5.6.3.2-9. LaRC AM1/MISR Reprocessing Product Archive Write Operations
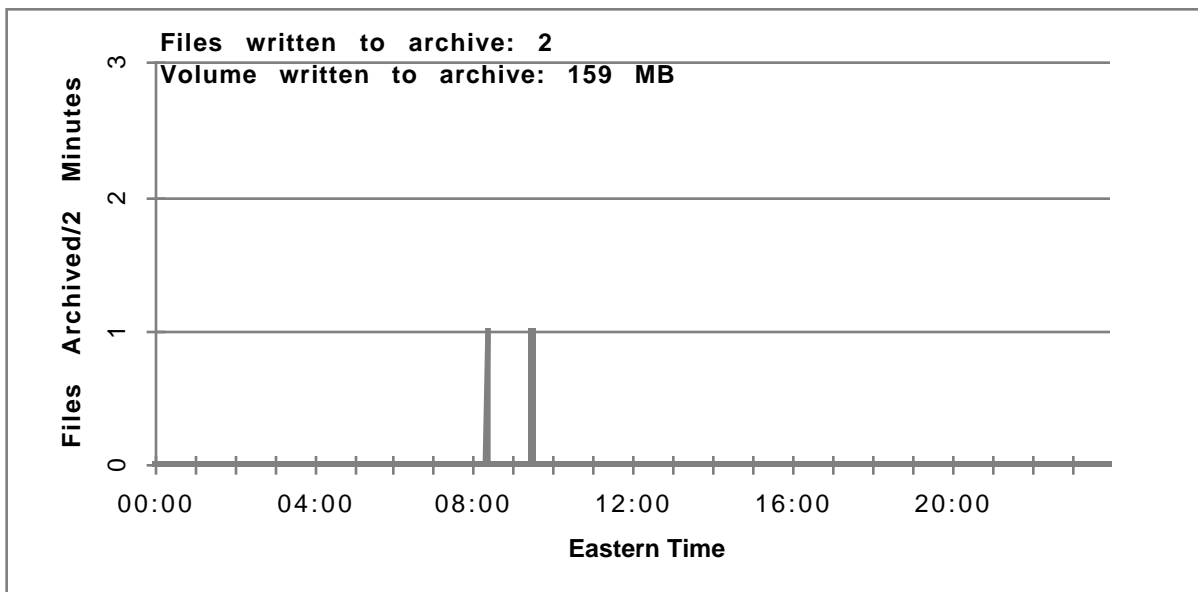

Figure 5.6.3.2-10. LaRC AM1/MOPITT Reprocessing Archive Write Operations
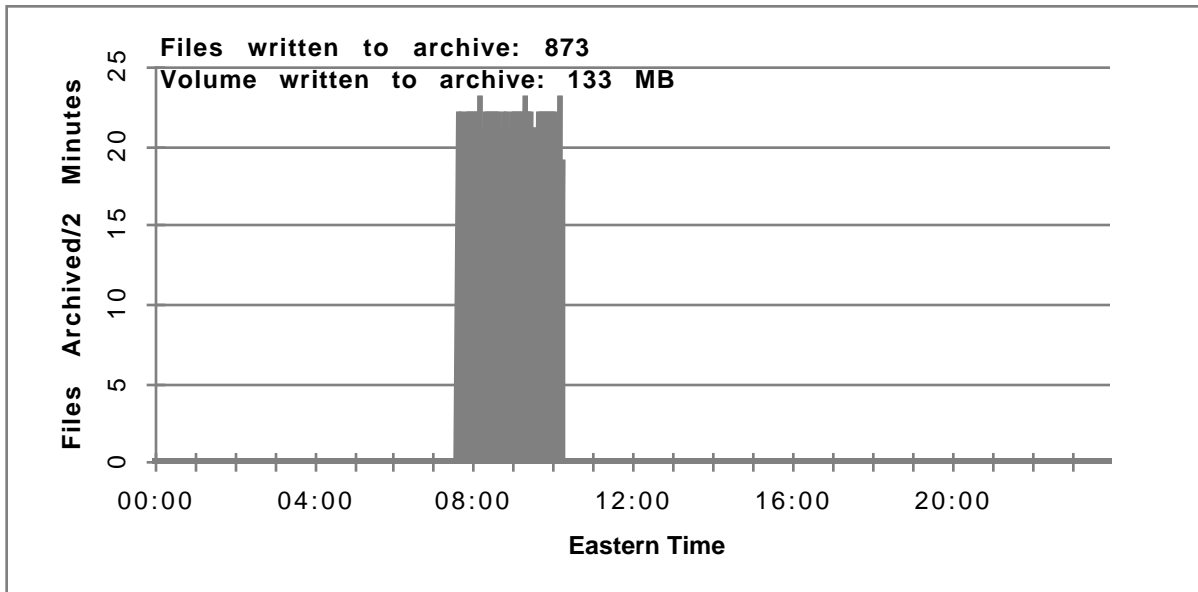
Figure 5.6.3.2-11. LaRC METEOR/SAGE III Reprocessing Product Archive Write Operations
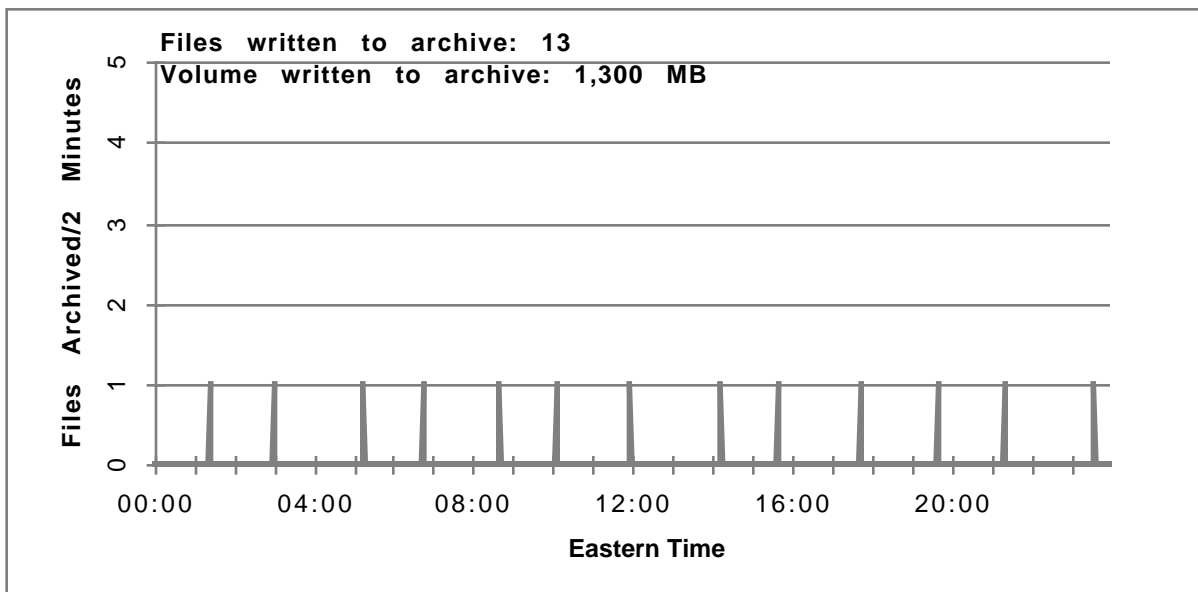
Figure 5.6.3.2-12. LaRC V0 Migration Archive Write Operations

Files written to archive: 576

Volume written to archive: 5,750 MB
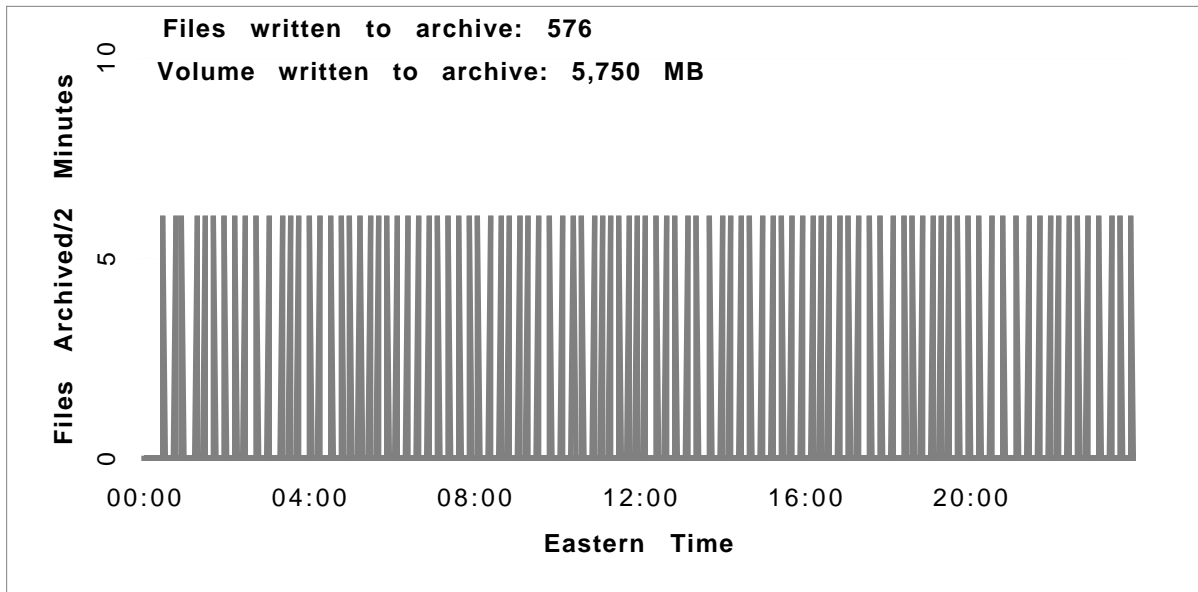
Figure 5.6.3.2-13. LaRC Ad Hoc Archive Write Operations

Files written to archive: 5,582

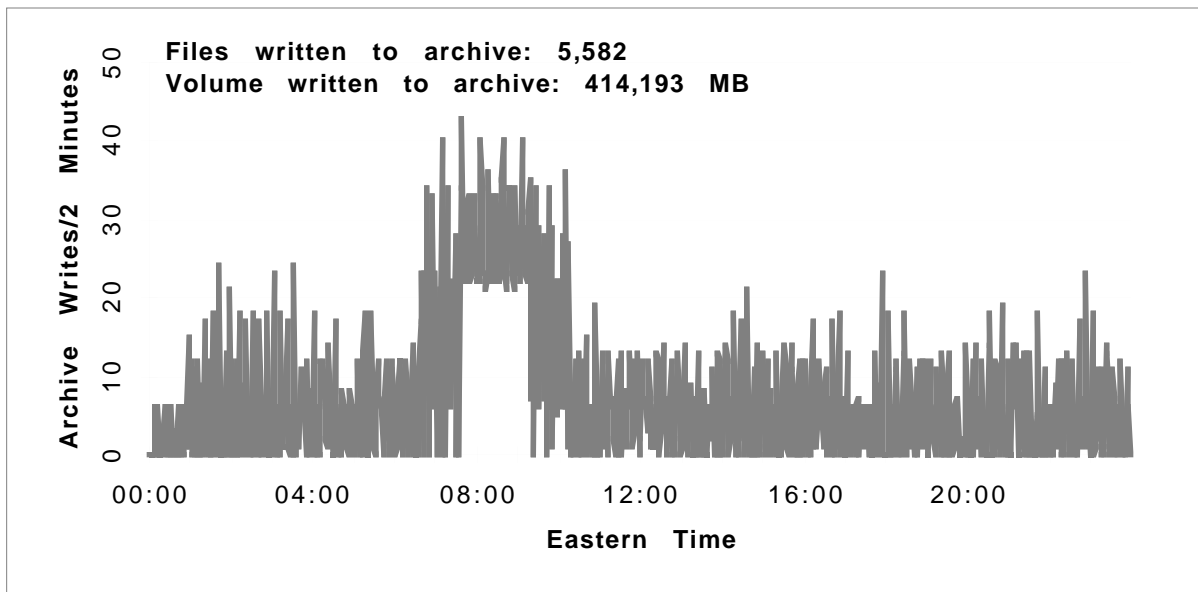**Volume written to archive: 414,193 MB**

Figure 5.6.3.2-14. LaRC Composite Archive Write Operations

5.6.3.3 LaRC Product Distribution Operations

5.6.3.3.1   LaRC Hard Media Distribution Operations

Table 5.6.3.3-1 summarizes the key parameters that influence distribution of hard media. The following steps in the creation of a media shipment are assumed:

1. Load media and initialize. The operator prints and applies the media labels, loads the media (either CD or Tape), and initiates writing of the media. It is assumed that any given order is limited to no more than 10 pieces of media. Larger orders are assumed to be segmented into multiple smaller orders.

2. Media creation. Data are written to the media.

3. Unload/reload. After the media are created, the media are unloaded and reloaded into a different device for a quality assurance read check.

4. Media QA. All data written to the media are read and compared to the original data.

5. Package. Media are unloaded, packaged, addressed, etc.

Figure 5.6.3.3-1 shows the day's hard media distribution backlog in terms of orders and media (and how it changed throughout the work day) for all data sets distributed by ECS. Figure 5.6.3.3-2 shows distribution of orders and number of media mapped against order size. Table 5.6.3.3-2 summarizes the day's media creation and distribution activities.

Table 5.6.3.3-1. LaRC Hard Media Distribution Parameters

Topic	Assumption
Hours of hard media distribution	7 days per week, 8 hours per day
Number of media distribution operators	1 per shift*
Touch time assumptions: 1. Load media and initialize	5 min. for 1st piece in an order, 1 min. for each additional piece of media
2. Media creation	Tape: • 500 KB/sec CD-ROM • 250 KB/sec
3. Unload/reload	5 min. for 1st piece in an order, 1 min. for each additional piece of media
4. Media QA	See step 2
5. Packaging	10 min. for 1st piece in an order, 2 min. for each additional piece of media
Minimum order size	100 MB
Media volume capacity 1. CD-ROM 2. Tape	 2,000 MB 10,000 MB

*   May also perform other functions including hard media ingest and/or mail distribution
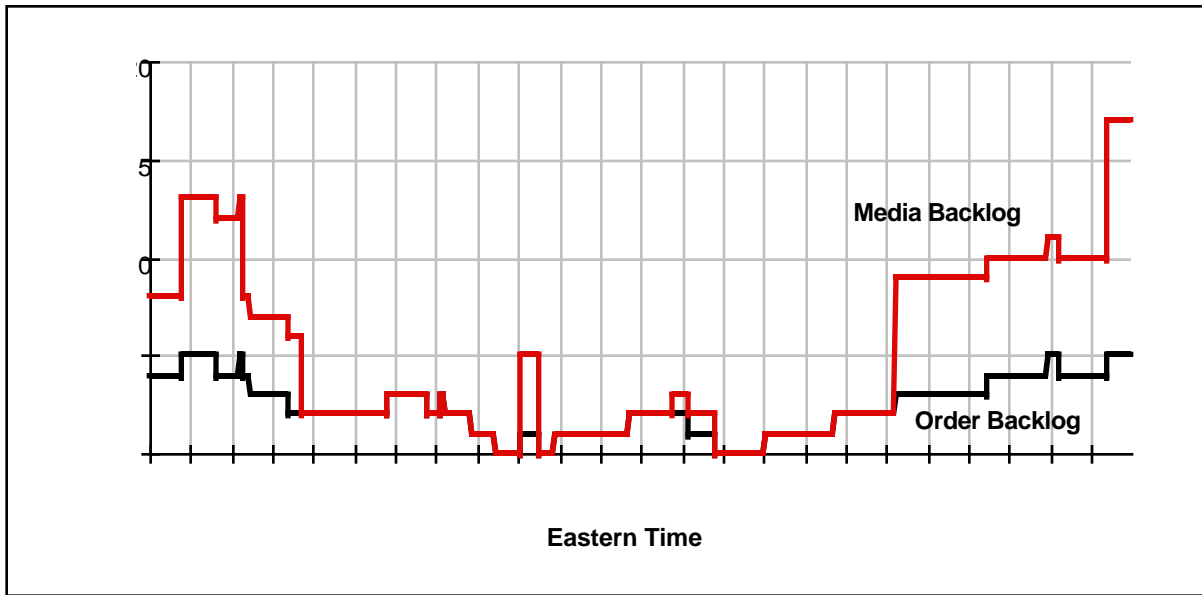
Figure 5.6.3.3-1. LaRC Hard Media Distribution Backlog

Figure 5.6.3.3-2. LaRC Orders and Media by Order Volume

Table 5.6.3.3-2. LaRC Media Distribution Summary

Topic	Number of orders	Volume (MB)	Number of media
Start of day in work	4	56,980	8
Start of day backlog	4	53,909	8
Orders received	15	244,347	36
Data distributed	14	81,838	19
End of day in work	4	143,546	16
End of day backlog	5	129,852	17

5.6.3.3.2   LaRC Electronic Distribution Operations

Electronic distribution is performed 24 hours/day, 7 days/week. Figure 5.6.3.3-3 shows the day's distribution of user sessions that connect to ECS through the LaRC DAAC.
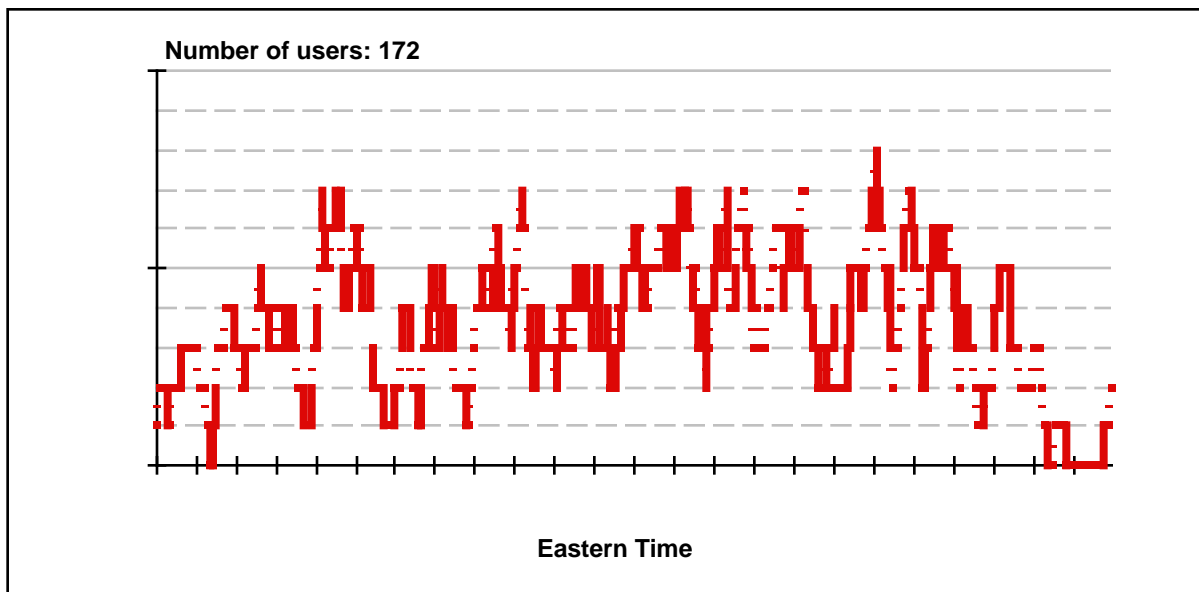

Number of users: 172

Eastern Time

Figure 5.6.3.3-3. LaRC User Sessions

5.7 Marshall Space Flight Center (MSFC)

This section is deleted in accordance with Technical Direction No. 17. Release B capabilities intended for the MSFC DAAC shall be installed and provided at the GSFC DAAC.